ABERDEEN

COMPLETE NETWORK SOLUTIONS

USER'S MANUAL

Stirling X39

Stirling X313

Stirling X317

Stirling X417

Stirling X525

CONTENTS

User's Manual - 1 -
Contents - 3 -
Notice - 4 -
Introduction - 5 -
Aberdeen Contact Information - 6 -
5-Year Warranty Terms and Conditions - 6 -
Mission Statement - 7 -
Company Background - 7 -
Goals - 8 -
The Aberdeen Advantage - 8 -
Aberdeen Leads Industry with 5-Year Warranty - 9 -
Custom Server Solutions Provider - 9 -
References - 10 -
Reviews and Awards - 11 -
Previous Comments from the Experts - 11 -
APPENDIX - A Backup Monster X39 - 12 -
Aberdeen Stirling X39sa - 13 -
X39sa Spec Sheet - 14 -
X39sa Disk Placement Chart - 15 -
APPENDIX - B Backup Monster X313 - 16 -
Aberdeen Stirling X313 - 17 -
X313 Spec Sheet - 18 -
X313 Disk Placement Chart - 19 -
APPENDIX - C Backup Monster X317 - 20 -
Aberdeen Stirling X317 - 21 -
X317 Spec Sheet - 22 -
X317 Disk Placement Chart - 23 -
APPENDIX - D TeraBuster - 24 -
Aberdeen Stirling X417 - 25 -
X417 Spec Sheet - 26 -
X417 Disk Placement Chart - 27 -
APPENDIX - E TeraStorus - 28 -
Aberdeen Stirling X525 - 29 -
X525 Spec Sheet - 30 -
X525 Disk Placement Chart - 31 -
APPENDIX - F RAID Web Management Utility - 32 -

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INTRODUCTION

Aberdeen LLC, the Custom Server Solution Provider, has provided an excellent selection of quality custom computing solutions to the IT professional for more than a decade. As an innovator of storage solutions Aberdeen has become a one-stop solution source for the IT Professional.

The computer industry is a continuously evolving marketplace. With a clear vision of the future, Aberdeen has become a trend setter via its vast technical experience and industry foresight. Aberdeen is a pioneer in providing customizable rack mounted servers, backup solutions and scalable NAS storage appliances.

Aberdeen Rackmount Storage Server applicable models.

- Aberdeen Stirling X39i “Backup Monster”
- Aberdeen Stirling X39iR “Backup Monster”
- Aberdeen Stirling X39sa “Backup Monster”
- Aberdeen Stirling X39saR “Backup Monster”
- Aberdeen Stirling X417 “TeraBuster”
- Aberdeen Stirling X525 “TeraStorus”

As an industry leader, Aberdeen not only reduces cost of ownership by offering the longest warranty in the industry, but also has demonstrated better performance and has proven to provide a better ROI than the competition in head-to-head comparisons.

ABERDEEN CONTACT INFORMATION

Aberdeen understands that service does not stop once a product ships. We sincerely hope there will never be a situation in which a problem arises; however, should there be a need for service, Aberdeen will be there to provide the prompt, courteous, and efficient service expected.

Headquarters

Address:	9130 Norwalk Blvd. Santa Fe Springs, California 90670
Telephone:	562-699-6998
Fax:	562-695-5570
Email:	GenSales@aberdeeninc.com
WWW:	www.Aberdeeninc.com

Customer Support

Hours:	Monday - Friday, 8am – 5pm PST
Telephone:	562-699-6998 ext. 152
Email:	CustomerService@aberdeeninc.com

Technical Support / RMA

Hours:	Monday - Friday, 8am – 5pm PST
Telephone:	562-699-6998 ext. 326
Email:	RMATech@aberdeeninc.com

5-YEAR WARRANTY TERMS AND CONDITIONS

Aberdeen provides an industry leading 5-Year Warranty on any of its fully configured rackmount servers. All Aberdeen fully configured rackmount solutions are warranted to be free of defects in materials for a period of five years from date of shipment or the lifetime of the product to be free of workmanship defects. A fully configured rackmount system is defined as a system, which in a single purchase includes the rackmount chassis, motherboard, processor(s) with appropriate cooling equipment, memory and hard disk drive(s) all assembled. This warranty does not cover any abuse, misuse or modification of products. We reserve the right to repair or replace the defective product under warranty as we see appropriate. We do not warrant uninterrupted or error-free operation of a product. We do not warrant that any product that you acquire will meet your individual requirements

"Aberdeen's warranty is 'REAL' and their response is immediate!"
- Customer testimonial; Mr. Tawfik Daoud, Maximus Inc.

MISSION STATEMENT

The Straight Talk People. - The primary business focus for Aberdeen is to be the IT professional's preeminent resource for complete network solutions, while remaining dedicated to building and maintaining excellent service and support relationships with its clientele.

COMPANY BACKGROUND

Founded in 1991, Aberdeen LLC is a leading direct marketer of rackmount servers, storage solutions, computers and computer hardware. Voted among The Direct 100 vendors by PC Computing magazine, Aberdeen designs, manufactures and customizes award-winning Aberdeen brand computer systems, Stirling rackmount servers, AberNAS storage appliances and backup storage servers. Aberdeen LLC provides assistance to its vast customer base in the planning, budgeting and implementation of complete network solutions including High-Performance Computing and NAS/SAN deployment within existing IT environments. For product sales, service or company information, contact Aberdeen at 800-552-6868, by fax at 562-695-5570 or visit www.aberdeeninc.com.

GOALS

To provide rack mounted server, data storage, and network solutions to the business, government, education and telecommunication sectors.

To continually offer a comprehensive selection of cutting-edge computer hardware components and be the single source for the most reliable and the best valued backend server networking solutions in the market.

To exceed its clients' expectations through dedicated one-on-one service, unequalled attention to detail, and custom solutions designed to overcome networking obstacles.

THE ABERDEEN ADVANTAGE

Aberdeen's consummate professional and highly experienced sales, management and technical teams are key elements in its ability to provide the finest complete network solutions and service available in the marketplace.

With unparalleled experience in the industry, Aberdeen has accumulated the expertise to design and custom configure any network ranging from a couple of workstations to a complete SAN/NAS network environment.

Aberdeen's ability to provide the best service and hardware availability is enhanced by its certifications and partnerships with the recognized leaders in the computer industry.

Company Certifications include:
- Microsoft Certified Partner
- Intel Premier Provider

Staff certifications and qualifications:
- Microsoft Certified Professional
- Microsoft Certified Systems Engineer
- Intel Certified Solution Consultant
- Intel Certified Integration Specialist
- Novell Unix and Linux Professionals

ABERDEEN LEADS INDUSTRY WITH 5-YEAR WARRANTY

Aberdeen is pleased to provide an industry leading 5-Year Warranty on any of its fully configured rackmount servers. Whether you select one of the pre-configured Stirling servers or custom design a complete server for yourself, it will be warranted to be free of defects in materials for a period of five years from the date of shipment and for the lifetime of the product to be free of workmanship defects.

CUSTOM SERVER SOLUTIONS PROVIDER

Aberdeen LLC has provided personal and corporate customers quality custom computing solutions for more than a decade. Customizable Stirling rack mounted servers, backup solutions and AberNAS storage appliances not only offer a longer warranty and demonstrate better performance, but have proven to provide a better ROI than the competition in head-to-head comparisons. Aberdeen offers a comprehensive product line for the Gaming Enthusiast to the IT Professional.

- Fully Customizable Rackmounts, Servers, Chassis and Systems
- Full Network Solutions and Rackmount Server Cabinet Models
- NAS/SAN Mass Storage Solutions Units and Appliances
- RAID protected Disaster Recovery and Backup Servers
- Governmental, Educational and Corporate Workstations
- Complete Server Solutions for Microsoft, Unix and Linux platforms
- Industrial PC Components; Data Acquisition, SBCs and Backplanes
- Hand Held & Modular Hard Drive Duplication
- Comprehensive line of PC Hardware

REFERENCES

Over the years Aberdeen LLC has been privileged to work with companies that share similar expectations and professional goals to its own such as unmatched customer service, personal and professional integrity, honest communication and the commitment to forming long-term partnerships.

The innovative Stirling “Backup Monster” storage server impressed Tawfik Daoud, senior system engineer of Maximus Inc. enough to praise Aberdeen in a recent letter. Mr. Daoud mentioned that he chose Aberdeen since the “Backup Monster” costs considerably less than the closest competitor and was “amazed” with the ease of implementation and performance. Mr. Daoud goes on to write in his testimonial.

"The "Backup Monster" is one step ahead in the backup industry and what I like most is that Aberdeen is backing it up."

The Stirling S21 Server appealed to David Featherstone, a network administrator for Timber Products, a company of 1,500 employees, who told PC Magazine how happy he is with the Stirling brand server and that he plans to purchase more in the future.

"Over the years, I've tried everything," Mr. Featherstone says. "I have built my own servers, or bought them from major vendors, but I really like these. The value you get for your money is impressive."

Satisfied clients are the best reference for Aberdeen. Below includes a sample of some of the world-class companies whose rack mounted server expectations have been exceeded by Aberdeen to the point that they have become frequent repeat customers.

Adventists	Intel	Ohio State University	University of Michigan
Boeing	Lockheed	Paramount Pictures	University of Washington
Computer Sciences Corp	Microsoft	Penn State University	US Army
Cornell University	Motorola	Raytheon	US Navy
Central Intelligence Agency	Northrup Grumann	Stanford University	Vanderbilt University
Dow Chemical	Novartis Pharmaceuticals	Timber Products	Verizon
IBM	Oak Ridge National Lab	UC Lawrence Berkeley Lab	Virgin Entertainment

REVIEWS AND AWARDS

Throughout the years Aberdeen LLC has received praise and critical acclaim for custom built servers and desktop systems. Take a look at these recent comments about Aberdeen Stirling Servers from - ***PC Magazine.***

"The Stirling S17 Merits an Honorable Mention" - ***PC Magazine 2003***

"The least expensive Intel-based server in our roundup, the Aberdeen Stirling S17 offers a lot of power and scalability for the money." - ***PC Magazine 2003***

"We were impressed with the Stirling S17's performance; it generally led the pack in test results" - ***PC Magazine 2003***

"Astonishingly Low Price. Inexpensive, Hardworking Server the Aberdeen Stirling S21 is a good choice." - ***PC Magazine 2002***

"With an Unrivaled five-year warranty … (the Stirling S21) offers comparable components and performance (to IBM)." - ***PC Magazine 2002***

PREVIOUS COMMENTS FROM THE EXPERTS

"The Claymore D90G is the fastest PC we've seen so far." - ***Maximum PC 2001***

"There's No Mystery Here- This One's a Beast … Aberdeen's Loch Ness machine is a tower of power." – Loch Ness D80G - ***Maximum PC 2001***

"Aberdeen shows us what a real gaming system should be all about with its latest computer." – Loch Ness D45G - ***PC Gamer Editors' Choice 1999***

APPENDIX - A

BACKUP MONSTER X39

ABERDEEN STIRLING X39SA

Incomparable
Aberdeen is proud to announce the revolutionary all inclusive storage and backup hybrid solution, the Stirling X39. This newest addition to our world famous line of Stirling Servers is the only SATA hot-swap 3U rackmount server that can store up to 2 Terabytes of data. This "Backup Monster" is suited to be the perfect solution for the IT Manager looking to find a beefy backup storage solution at the most affordable price available.

Stirling X38

Our "Backup Monster" costs as little as 1/10th the cost of a backup solution by any other company. This magnificent machine clearly surpasses any server on the market. This beast can be featured with either 8 SATA disk drives for the cost conscious IT Manager or provide increased storage capacity with additional XDAS scalable arrays. The Aberdeen Stirling X39 features the newly released Intel E7520 chipset (Lindenhurst) featuring PCI Express and DDR2 capability, Extended Memory 64 Technology (EM64T), and an 800MHz processor system bus to support the latest Intel Xeon (Nocona) dual processors with 1MB L2 cache and 800 MHz system bus for servers and workstations. The SATA Aberdeen Stirling X39 comes with 8 hot-swap drive bays, dual Gigabit LAN, 64 bit Raid controller and has space for an internal tape backup drive and a CD-RW drive. Housed in an ultra-dense 3U chassis and utilizing the Intel E7520 chipset, it guarantees the most computing power in any 3U platform, and by design the Stirling X39 provides scalability for any enterprise looking for the ultimate storage and backup solution.

Available with Dantz Retrospect Backup Software.

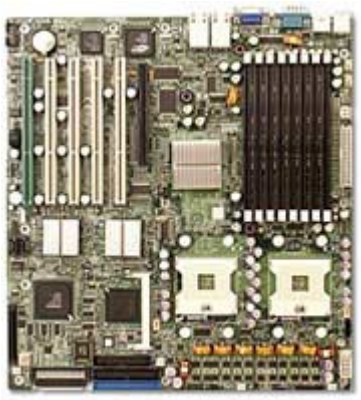
NAS AVAILABLE

X39SA SPEC SHEET

ABERDEEN STIRLING X39 RACKMOUNT
"BACKUP MONSTER" SERVER

MANUFACTURER PART#	SRVX39 **BLACK RACK**
ABERDEEN PART#	SRVX39
PROCESSOR	Dual Socket 604 Supports Dual Intel® Xeon processors Front-Side Bus support for 533MHz or 400MHz Onboard 3-phase switching power regulator
CHIPSET	**ServerWorks. Grand Champion. SL chipset**
SYSTEM MEMORY	8 x 240-Pin DIMM Sockets **Up to 16GB DDR2-400 registered ECC** **Dual channel memory bus** **ECC Registerd DDR2 SDRAM ONLY** 2-way interleave provides outstanding performance (memory must be used in pairs)
ON BOARD I/O	1 x Floppy Connector 2 x Serial 16550 compatible ports 2 x USB 2.0 Ports PS/2 keyboard and mouse ports
ON BOARD IDE	Dual EIDE ports support Ultra DMA 100MB/s of Burst data transfer rate, supports UDMA Mode 5, PIO Mode 4 and ATAPI
VIDEO	ATI Rage XL 8MB PCI graphic controller
ON BOARD LAN	**Intel 82546GB Dual Gigabit controller** 2 x 10/100/1000 ports
SATA RAID	**8-Port SATA II 3Gb/s RAID** SATA backplane provides power, bus termination **8 Hot-Swap/Hot-Spare SATA300 drive bays** scalable, and high-performance hardware RAID isolation. **RAID 0, 1, 10, 5, 6, and JBOD support** SCSI performance feature set
SCSI CONTROLLER	**LSI Logic 21320 Dual Channel Ultra320 SCSI card** External Wide SCSI connector (available connectors for internal or external SCSI tape drives)
SCALABLE SOLUTION	Connects to Aberdeen XDAS Direct Attached Storage Device **Connect up to 3 devices with SCSI port.**
PC HEALTH MONITORING	Onboard voltage monitors for CPU Fan status Environmental temperature monitor and control Chassis and CPU overheat alarm, LED indication and control System resource alert Supermicro System Management utility
BIOS	AMI® BIOS on 4Mbit Flash ROM User settings for hardware monitoring Auto-configuration of IDE hard drive types Multiple boot options
EXPANSION SLOTS	1 x (x8) PCI Express Slot **Total of 5 PCI-X** (1 x 64-bit PCI slot populated w/SATA II controller) (1 x 64-bit PCI slot populated w/LSI SCSI controller) (3 x Empty 64-bit PCI-X Slots)
BOARD SIZE	Full ATX 12" x 9.6" in.(W x H)
EXPANSION BAYS	1 x 3.5" drive bay 1 x Slim 5.25" drive bay 2 x 5.25" drive bays 8 x 3.5" x 1" drive bays
CHASSIS FEATURES	19" rackmount ATX (3U height, 25.4" Depth) **550W Power Supply or** **760W Triple Redundant Hot-Plug** Auto-switching 100/240V AC power 4 x 5000 RPM Hot-swappable Cooling Fans 2 x 5000 RPM Rear Exhaust Fan LED indicators for power on, network activity, IDE HDD activity Power ON/OFF and system reset switches

Includes 1 x 3.5" floppy drive
Slim CD-Rom Drive
Rackmount Rails



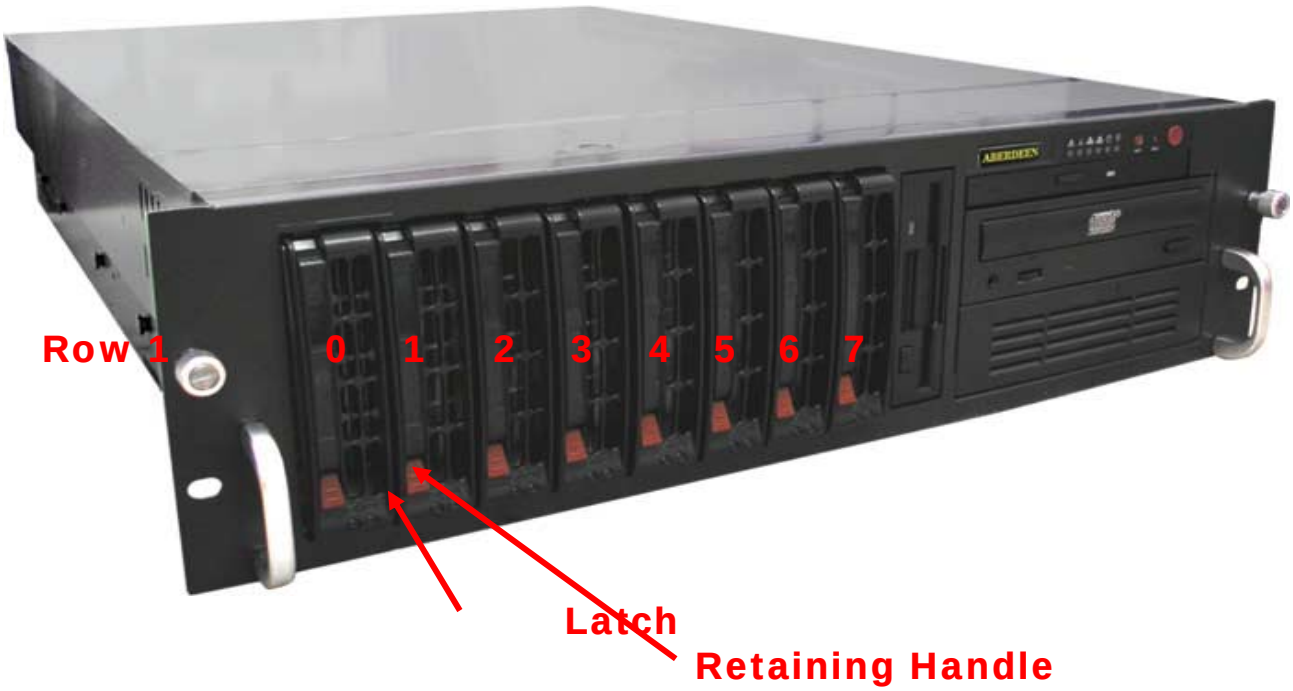
X39SA DISK PLACEMENT CHART

WARNING – The disk drive trays must be properly seated completely back into their sockets and they must be in their proper positions in order to avoid software corruption and/or hardware damage.

Please carefully read the following:

Your server has a row of eight hard disk drives. The row is numbered from left to right. For safety during shipment to you, the drives have been removed and shipped separately.

The number stickers on the hard drive packages correspond to their placement in the chassis. Proper placement of the drives is critical in retaining the integrity of any software or operating system that has been loaded.



Slide the hard drive into place with the retaining handle extended. When the drive is fully inserted, push the retaining handle back until it is fully seated and snapped into the latch.

Should you require technical assistance with this or any other aspect of your Aberdeen server, contact us toll free at (800)552-6868 option 3 from 8:00am to 5:00pm PST.

APPENDIX - B

BACKUP MONSTER X313

ABERDEEN STIRLING X313

Stirling X312

dantz

Dantz Retrospect
Backup Software.

NAS AVAILABLE

INCOMPARABLE:
Aberdeen is proud to announce the improved capacity all inclusive storage and backup hybrid solution. The **Stirling X313** is a condensed version of the original revolutionary "Backup Monster" model. By sacrificing one of the two available 5.25 bays the X313 can pack up to 4.8TB & continue to have room for a tape backup device. As with our world famous line of Stirling Servers, this hot-swap 3U rackmount server that can store data disk to disk and provide the ability for additional tape backup. This Super "Backup Monster" is suited to be the perfect hybrid solution for the IT Manager looking for a storage solution at the best cost per TB ratio.

Our Super "**Backup Monster**" costs as little as 1/10th the cost of a backup solution by any other company. This magnificent machine clearly surpasses any server on the market. This beast can be featured with SATA disk drives for those that require the most computing power possible. The **Aberdeen Stirling X313** features the newest Intel E7520 chipset (Lindenhurst) featuring PCI Express and DDR2 capability, Extended Memory 64 Technology (EM64T), and an 800MHz processor system bus to support the latest Intel Xeon (Nocona) dual processors with 1MB L2 cache and 800 MHz system bus for servers and workstations. The SATA Aberdeen Stirling X313 comes with 12 hot-swap drive bays, dual Gigabit LAN, 64 bit Raid controller and has space for an internal tape backup drive and a CD-RW drive. Housed in an ultra-dense 3U chassis and utilizing the Intel E7520 chipset, it guarantees the most diverse storage capacity in any 3U platform, and by design the Stirling X313 provides scalability for any enterprise looking for the ultimate storage and backup solution with the **XDAS scalable arrays**.

X313 SPEC SHEET

ABERDEEN STIRLING X313
3U RACKMOUNT BACKUP SERVER

MANUFACTURER PART#	SRVX313 **BLACK RACK**
ABERDEEN PART#	KITX313
PROCESSOR	Dual Socket 604 Dual Intel® Xeon™ Processors EM64T Support
CHIPSET	**Intel E7520 "Lindenhurst" chipset** **800 MHz FSB**
SYSTEM MEMORY	8 x 240-Pin DIMM Sockets **Up to 16GB DDR2-400 registered ECC** **Dual channel memory bus** **ECC Registerd DDR2 SDRAM ONLY** 2-way interleave provides outstanding memory performance (memory must be used in pairs)
ON BOARD I/O	1 x Floppy Connector 2 x Serial 16550 compatible ports 2 x USB 2.0 Ports PS/2 keyboard and mouse ports
ON BOARD IDE	Dual EIDE ports support Ultra DMA 100MB/s of Burst data transfer rate, supports UDMA Mode 5, PIO Mode 4 and ATAPI
VIDEO	ATI Rage XL 8MB PCI graphic controller
ON BOARD LAN	**Intel 82546GB Dual Gigabit controller** 2 x 10/100/1000 ports
SATA RAID	**12-Port SATA II 3Gb/s RAID** SATA backplane provides power, bus termination **12 Hot-Swap/Hot-Spare SATA300 drive bays** scalable, and high-performance hardware RAID isolation. **RAID 0, 1, 10, 5, 6, and JBOD support** SCSI performance feature set
SCSI CONTROLLER	**LSI Logic 21320 Dual Channel Ultra320 SCSI card** External Wide SCSI connector (available connectors for internal or external SCSI tape drives)
SCALABLE SOLUTION	Connects to Aberdeen XDAS Direct Attached Storage Device **Connect up to 3 devices with SCSI port.**
PC HEALTH MONITORING	Onboard voltage monitors for CPU Fan status Environmental temperature monitor and control Chassis and CPU overheat alarm, LED indication and control System resource alert Supermicro System Management utility
BIOS	Phoenix 4Mb Flash ROM RTC (Real-Time Clock) wakeup External modem remote ring-on IF system is in Soft-Off state BIOS rescue hot keys rescue BIOS chip from flash failure Hardware BIOS virus protection Chipkill support
EXPANSION SLOTS	1 x (x8) PCI Express Slot **Total of 5 PCI-X** (1 x 64-bit PCI slot populated with SATA II controller) (1 x 64-bit PCI slot populated with LSI SCSI controller) (3 x Empty 64-bit PCI-X Slots)
BOARD SIZE	Full ATX 12" x 13" in.(W x H)
EXPANSION BAYS	1 x 2.5" internal drive bay 1 x 5.25" slim external bay (cd-rom) 1 x 3.5" slim external (floppy) 16 x 3.5" x 1" drive bays
CHASSIS FEATURES	19" rackmount ATX (3U height/27" Depth) Heavy-duty cold-rolled steel with Zinc-plated interior Accepts Full Size Motherboard (12x13) **650W 2+1 Redundant Hot-Swap** 2 x 40MM Expansion Card Cooling Fans 3 x 80MM Hot Swap System Cooling Fans 2 x 60MM Rear Exhaust Fans Optimized HDD tray spacing to maximize air flow Buzzer alarm for fan failure and overheat warning
WARRANTY	1-year parts, 2-year labor warranty

X313 DISK PLACEMENT CHART

WARNING – The disk drive trays must be properly seated completely back into their sockets and they must be in their proper positions in order to avoid software corruption and/or hardware damage.

Please carefully read the following:

Your server has three rows of four hard disk drives. Each row is numbered from left to right. For safety during shipment to you, the drives have been removed and shipped separately.

The number stickers on the hard drive packages correspond to their placement in the chassis. Proper placement of the drives is critical in retaining the integrity of any software or operating system that has been loaded.

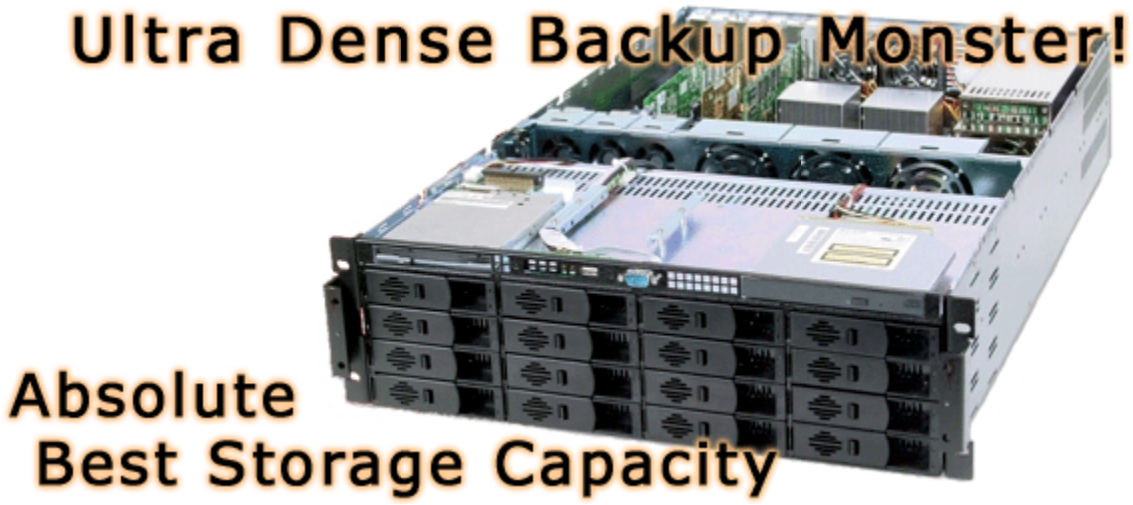
Slide the hard drive into place with the retaining handle extended. When the drive is fully inserted, push the retaining handle back until it is fully seated and snapped into the latch.

Should you require technical assistance with this or any other aspect of your Aberdeen server, contact us toll free at (800)552-6868 option 3 from 8:00am to 5:00pm PST.

APPENDIX - C

BACKUP MONSTER X317

ABERDEEN STIRLING X317



Stirling X316

dantz

Dantz Retrospect
Backup Software.

NAS AVAILABLE

INCOMPARABLE:
Aberdeen is proud to announce the improved capacity all inclusive With the release of the newest extension to the 3U SATA "Backup Monster" storage servers the Stirling X317 provides the absolute largest storage capacity in a 3U format. As an addition to our world famous line of Stirling Servers, this hot-swap 3U rackmount server that can store up to **over 6 Terabytes of data**. This "Backup Monster" is suited to be the perfect solution for the IT Manager looking to find a beefy storage solution at the most affordable price.

Our Ultra Dense "**Backup Monster**" costs as little as 1/10th the cost of a backup solution by any other company. This storage beast is capable of storing up to 6.4TB. This beast can be featured with SATA disk drives for those that require the most computing power possible. The **Aberdeen Stirling X317** now features the newly released Intel E7520 chipset (Lindenhurst) featuring PCI Express and DDR2 capability, Extended Memory 64 Technology (EM64T), and an 800MHz processor system bus to support the latest Intel Xeon (Nocona) dual processors with 1MB L2 cache and 800 MHz system bus for servers and workstations. The SATA Aberdeen Stirling X317 comes with 16 hot-swap drive bays, dual Gigabit LAN, 64 bit Raid controller and has a slim CD-ROM and floppy drive. Housed in an ultra-dense 3U chassis and utilizing the Intel E7520 chipset, it guarantees the absolute best storage capacity available in any 3U platform, and by design the Stirling X317 provides scalability for any enterprise looking for the ultimate storage and backup solution with the **XDAS scalable arrays**.

X317 SPEC SHEET

ABERDEEN STIRLING X317
3U RACKMOUNT BACKUP SERVER

MANUFACTURER PART#	SRVX317 **BLACK RACK**
ABERDEEN PART#	KITX317
PROCESSOR	Dual Socket 604 Dual Intel® Xeon™ Processors EM64T Support
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WARRANTY	1-year parts, 2-year labor warranty

X317 DISK PLACEMENT CHART

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Please carefully read the following:

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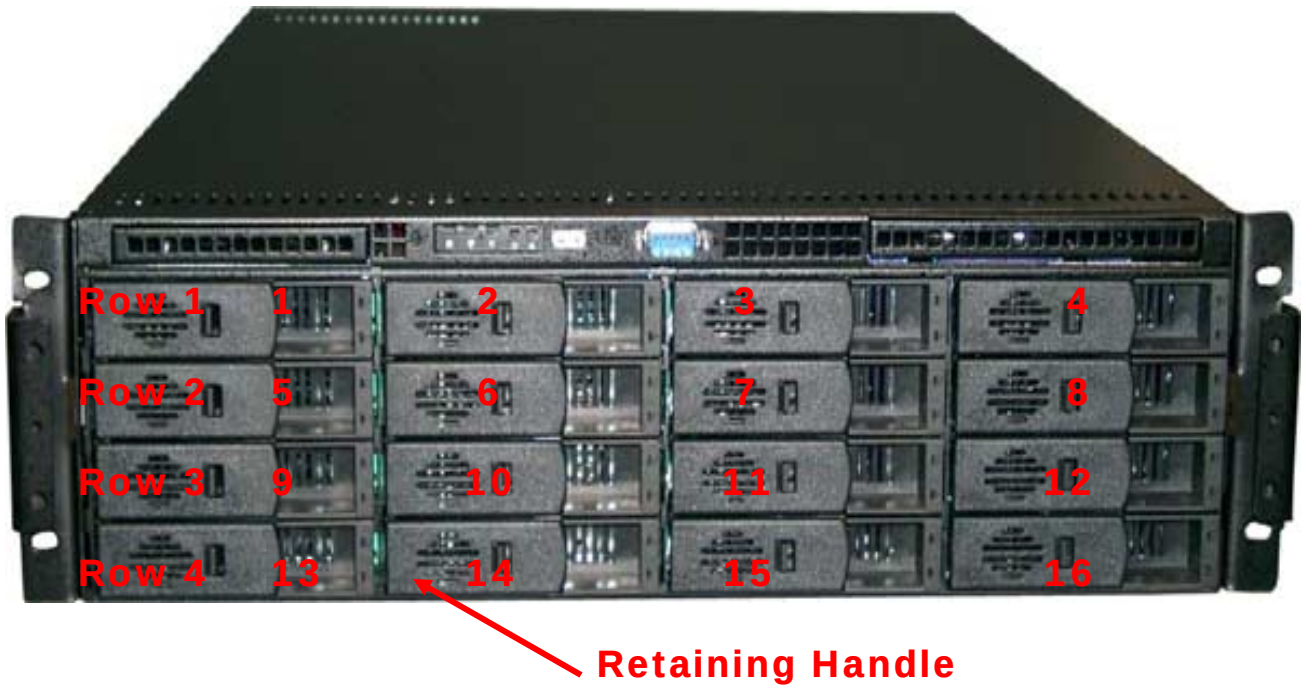
The number stickers on the hard drive packages correspond to their placement in the chassis. Proper placement of the drives is critical in retaining the integrity of any software or operating system that has been loaded.



Slide the hard drive into place with the retaining handle extended. When the drive is fully inserted, push the retaining handle back until it is fully seated and snapped into the latch.

Should you require technical assistance with this or any other aspect of your Aberdeen server, contact us toll free at (800)552-6868 option 3 from 8:00am to 5:00pm PST.

APPENDIX - D

TERABUSTER

ABERDEEN STIRLING X417

Stirling X417

Incomparable

We are proud to announce the newest addition to our revolutionary line of Stirling all-inclusive storage and backup servers, the Aberdeen Stirling "**TeraBuster.**" First Aberdeen created the "**Backup Monster**" with an amazing 2 Terabytes of backup storage capacity for under $5000. Based on our customers demands, we have pushed the proverbial envelope to offer an unparalleled 4 Terabytes of SATA storage space for under $12,000. As with the "Backup Monster," the "TeraBuster" integrates Dantz Development's Retrospect™ backup software and be configured with dual Intel® Xeon™ processors for those that require the most computing power possible. Businesses can now safely guard against downtime and the loss of critical data with the Stirling line of backup servers.

The Aberdeen "TeraBuster" establishes a new standard for the server storage market, by offering a 4U rackmount server with up to 4 Terabytes of SATA hot-swap storage space. Every Stirling "TeraBuster" backup server includes; 16 hot-swap/hot-spare drive bays, dual gigabit NICs, an internal wall of cooling fans and support for RAID 0,1,5 & 10. Options include; a tape drive, two internal OS hard drives, CD-RW, a triple redundant 650W power supply and Dantz Development's Retrospect™ backup software to provide data security, disaster recovery and file storage capabilities. Call for **AMD Opteron™** approved models.

dantz

Available with Dantz
Retrospect Backup Software.

X417 SPEC SHEET

MANUFACTURER PART#	BBX417 **BLACK RACK**
ABERDEEN PART#	KITX417
PROCESSOR	Dual Socket 604 **Supports Dual Intel® Xeon processors** Front-Side Bus support for 533MHz or 400MHz Onboard 3-phase switching power regulator
CHIPSET	**Intel E7501 Server chipset**
SYSTEM MEMORY	8 x 184-Pin DIMM Sockets **Up to 16GB ECC Registered DDR266 SDRAM** Compatible with PC2100 and PC1600 **ECC Registerd DDR SDRAM ONLY** Two-way interleaved memory banks provide outstanding memory performance.
ON BOARD I/O	1 x Floppy Connector 2 x Serial 16550 compatible ports 2 x USB 1.1 Ports PS/2 keyboard and mouse ports
ON BOARD IDE	Dual EIDE ports support Ultra DMA 100MB/s of Burst data transfer rate, supports UDMA Mode 5, PIO Mode 4 and ATAPI
VIDEO	ATI Rage XL 8MB PCI graphic controller
ON BOARD LAN	**Dual Gigabit with Intel 82546EB Controller** 2 x 10/100/1000 ports
SATA RAID	**16-Port SATA II 3Gb/s RAID** SATA backplane provides power, bus termination **16 Hot-Swap/Hot-Spare SATA300 drive bays** scalable, and high-performance hardware RAID isolation. **RAID 0, 1, 10, 5, 6, and JBOD support** SCSI performance feature set
PC HEALTH MONITORING	Onboard voltage monitors for CPU Fan status Environmental temperature monitor and control Chassis and CPU overheat alarm, LED indication and control System resource alert Supermicro System Management utility
BIOS	Phoenix 4Mb Flash ROM RTC (Real-Time Clock) wakeup External modem remote ring-on when system is in Soft-Off state BIOS rescue hot keys for rescuing BIOS chip from flash failure Hardware BIOS virus protection Chipkill support
EXPANSION SLOTS	3 x 64-bit 100MHz PCI-X 1 x 64-bit 66MHz PCI (2 x 64-bit PCI slots populated w/SATA II controllers) 1 x VXB (Virtual Extended Bus)
BOARD SIZE	Full ATX 12" x 13" in.(W x H)
EXPANSION BAYS	1 x 3.5" external drive bay 1 x 3.5" internal drive bay 1 x 5.25" external drive bay **1 x 5.25" slim drive bay***new feature* 16 x 3.5" x 1" drive bays
CHASSIS FEATURES	19" rackmount ATX (4U height) - RM414 24" Depth, Accepts Full Size Motherboard (12x13) **650W Triple Redundant Hot-Swap** 5 x 8cm easy swap cooling fans Optimized HDD interspace to maximize inlet air flow Buzzer alarm for fan failure and overheat warning

Includes 1 x 3.5" floppy drive
Slim CD-Rom Drive
Rackmount Rails

X417 DISK PLACEMENT CHART

WARNING – The disk drive trays must be properly seated completely back into their sockets and they must be in their proper positions in order to avoid software corruption and/or hardware damage.

Please carefully read the following:

Your TeraBuster has four columns of four hard disk drives. The columns are labeled alphabetically from left to right and the rows are numbered from top to bottom. For safety during shipment to you, the drives have been removed and shipped separately.

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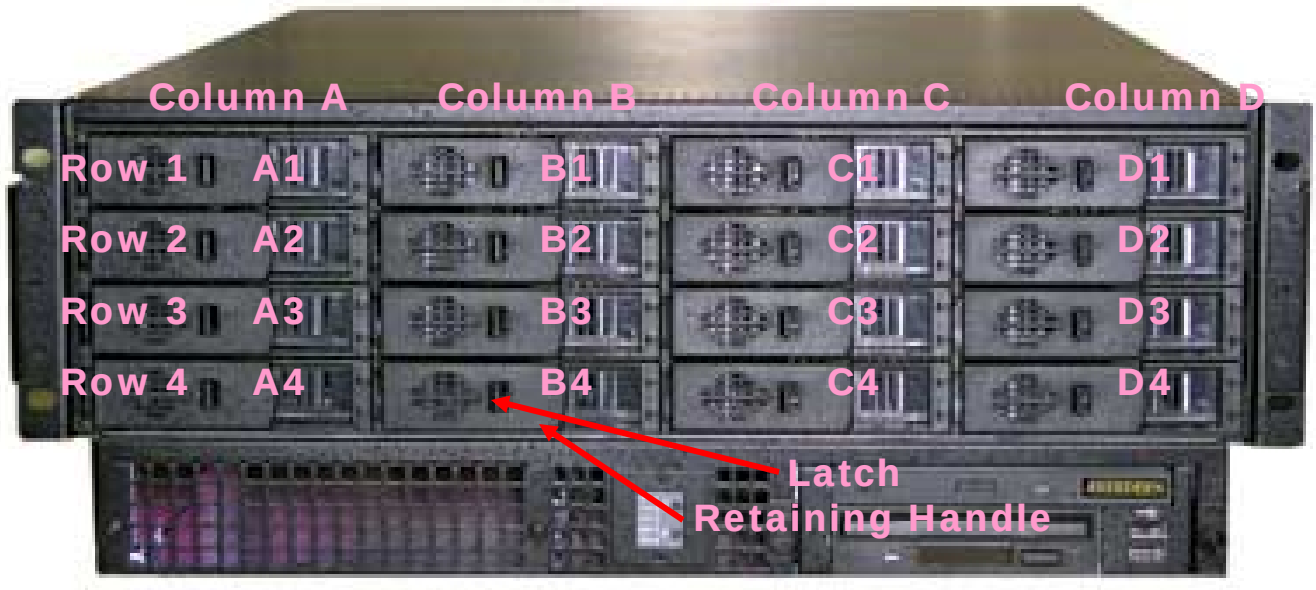

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APPENDIX - E

TERASTORUS

ABERDEEN STIRLING X525

Incomparable
The all-inclusive Aberdeen Stirling X525 storage backup server, dubbed the "**TeraStorus**" can provide up to 12TB of true SATA II 3Gb/s pure single array storage starting under $17,000.

The custom configurable "TeraStorus" rackmount server is configured with dual Intel® Xeon™ processors for those that require the most computing power possible. Also included are 24 hot-swap/hot-spare drive bays with storage capacity up to 12TB, (with Hitachi Deskstar 7K500 500GB SATA-II 3Gb/s Hard Drives) dual gigabit NICs, SATA II controllers supporting RAID 0,1,5, 6 & 10, a remote RAID management port, an internal wall of cooling fans and the TeraStorus can be supersized via an external SCSI port for expansion up to 40TB through the addition of up to five 8TB XDAS storage expansion boxes per SCSI channel, thus creating a **scalable NAS server**.

Configured with dual Intel® Xeon™ processors, a triple redundant 950W power supply and up to 16GB of DDR2-400 memory. The Stirling X525 performs with multiple OS platforms for full interoperability in heterogeneous environments. Options include the flexibility for; two internal OS hard drives, a tape drive, DVD-R or CD-RW, and upgrades such as iSCSI, NAS and backup software.

The complete Aberdeen line of Stirling storage servers satisfies the need for high-volume speed and builds upon the greatest flexibility, scalability and efficient storage to provide a better, faster and more cost -effective storage solution. Call for **AMD Opteron™** approved models.

Available with Dantz
Retrospect Backup Software.

X525 SPEC SHEET

MANUFACTURER PART#	BBX525 **BLACK RACK**
ABERDEEN PART#	KITX525
PROCESSOR	Dual Socket 604 **Supports Dual Intel® Xeon processors** Front-Side Bus support for 533MHz or 400MHz Onboard 3-phase switching power regulator
CHIPSET	**Intel E7501 Server chipset**
SYSTEM MEMORY	8 x 184-Pin DIMM Sockets **Up to 16GB ECC Registered DDR266 SDRAM** Compatible with PC2100 and PC1600 **ECC Registerd DDR SDRAM ONLY** Two-way interleaved memory banks provide outstanding memory performance.
ON BOARD I/O	1 x Floppy Connector 2 x Serial 16550 compatible ports 2 x USB 1.1 Ports PS/2 keyboard and mouse ports
ON BOARD IDE	Dual EIDE ports support Ultra DMA 100MB/s of Burst data transfer rate, supports UDMA Mode 5, PIO Mode 4 and ATAPI
VIDEO	ATI Rage XL 8MB PCI graphic controller
ON BOARD LAN	**Intel 82546EB Dual Gigabit controller** 2 x 10/100/1000 ports
ON BOARD SCSI	**Dual channel Adaptec® AIC-7902 controller Ultra320 SCSI** External Bracket w/ Wide SCSI connector (available connectors for internal or external SCSI tape drives)
OS DRIVE MIRROR	For added system safety and system failover Fixed internal IDE drives
SATA RAID	**24-Port SATA II 3Gb/s RAID** SATA backplane provides power, bus termination **24 Hot-Swap/Hot-Spare SATA300 drive bays** scalable, and high-performance hardware RAID isolation. **RAID 0, 1, 10, 5, 6, and JBOD support** SCSI performance feature set
PC HEALTH MONITORING	Onboard voltage monitors for CPU Fan status Environmental temp monitor and control Chassis and CPU overheat alarm, LED indication and control System resource alert Supermicro System Management utility
BIOS	Phoenix 4Mb Flash ROM RTC (Real-Time Clock) wakeup External modem remote ring-on when system is in Soft-Off state BIOS rescue hot keys for rescuing BIOS chip from flash failure Hardware BIOS virus protection Chipkill support
EXPANSION SLOTS	**Total of 6 PCI-X** (3 x 64-bit PCI slots populated w/SATA II controllers) (3 x Empty 64-bit PCI-X Slots) 1 x VXB (Virtual Extended Bus)
BOARD SIZE	Full ATX 12" x 13" in.(W x H)
EXPANSION BAYS	1 x 3.5" external drive bay / 2 x 3.5" internal drive bay 1 x 5.25" external drive bay 1 x 5.25" slim drive bay / 24 x 3.5" x 1" drive bays
CHASSIS FEATURES	19" rackmount ATX (5U height) - RMC5E 25.4" Depth, Accepts Full Size Motherboard (12x13) **950W 3+1 Triple Redundant Hot-Swap** 2 x 12cm Hot-Swap Blowers 2 x 60X39mm Fans Exhaust Fans Optimized HDD interspace to maximize inlet air flow Buzzer alarm for fan failure and overheat warning

ABERDEEN

Includes 1 x 3.5" floppy drive
Slim CD-ROM Drive
Rackmount Rails

intel inside XEON

X525 DISK PLACEMENT CHART

WARNING – The disk drive trays must be properly seated completely back into their sockets and they must be in their proper positions in order to avoid software corruption and/or hardware damage.

Please carefully read the following:

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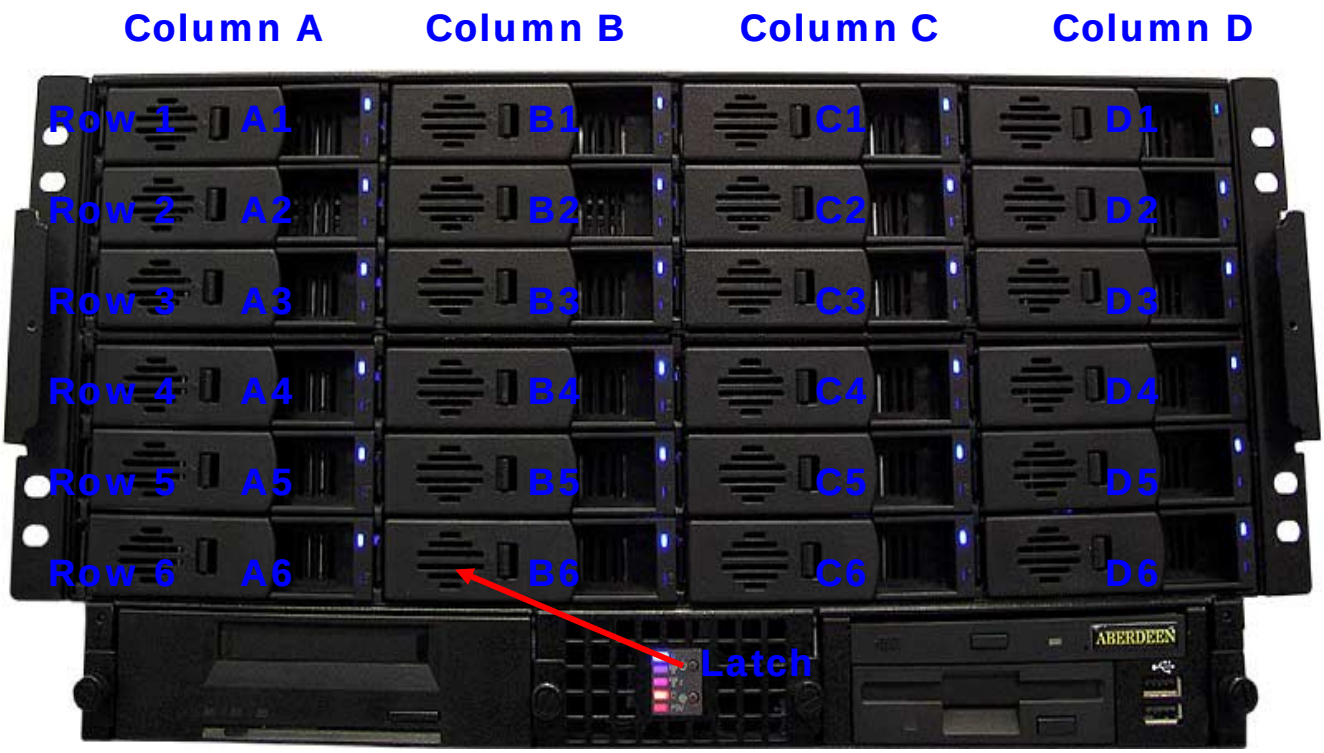

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APPENDIX - F

RAID WEB MANAGEMENT UTILITY

SATA RAID Cards

ARC-1110/1120/1130/1160/1170

(4/8/12/16/24-port PCI-X SATA RAID Controllers)

ARC-1110ML/1120ML/1130ML/1160ML

(4/8/12/16-port PCI-X SATA RAID Controllers)

ARC-1210/1220/1230/1260

(4/8/12/16-port PCI-Express SATA RAID Controllers)

USER Manual

Version: 2.10
Issue Date: May, 2005

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Microsoft WHQL Windows Hardware Compatibility Test

ARECA is committed to submit to Microsoft Windows Hardware Quality Labs (WHQL) for participation in the Windows Logo Program. Successful passage of the WHQL tests results in both the "Designed for Windows" logo for qualifying ARECA PCI-X or PCI-Express SATA RAID controllers and a listing on the Microsoft Hardware Compatibility List (HCL).

WARRANTY

The information in this document is subject to change without notice. We make no warranty of any kind regarding this material, including, but not limited to, the implied warranties or merchantability and fitness for a particular purpose. Furthermore, we shall not be liable for errors contained herein or for incidental or consequential damage in connection with the furnishing, performance, or use of this material.

FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Contents

1. Introduction 8
1.1 Overview 8
1.2 Features 10
1.3 RAID Concept 12
1.3.1 RAID Set 12
1.3.2 Volume Set 12
1.3.3 Easy of Use Features 13
1.3.3.1 Instant Availability/Background Initialization 13
1.3.3.2 Array Roaming 13
1.3.3.3 Online Capacity Expansion 14
1.3.4 Online RAID Level and Stripe Size Migration 15
1.4 High availability 15
1.4.1 Creating Hot Spares 15
1.4.2 Hot-Swap Disk Drive Support 16
1.4.3 Hot-Swap Disk Rebuild 16
1.5 Understanding RAID 16
1.5.1 RAID 0 17
1.5.2 RAID 1 17
1.5.3 RAID 10 18
1.5.4 RAID 3 18
1.5.5 RAID 5 19
1.5.6 RAID 6 19
2. Hardware Installation 22
2.1 Before Your begin Installation 22
2.2 Board Layout 23
2.3 Installation 27
3. McBIOS RAID Manager 38
3.1 Starting the McBIOS RAID Manager 38
3.2 McBIOS Configuration manager 39
3.3 Configuring Raid Sets and Volume Sets 40
3.4 Designating Drives as Hot Spares 40
3.5 Using Quick Volume /Raid Setup Configuration 41
3.6 Using Raid Set/Volume Set Function Method 42
3.7 Main Menu 44
3.7.1 Quick Volume/RAID Setup 45
3.7.2 Raid Set Function 47
3.7.2.1 Create Raid Set 48

3.7.2.2 Delete Raid Set 49
3.7.2.3 Expand Raid Set 49
• Migrating 50
3.7.2.4 Activate Incomplete Raid Set 51
3.7.2.5 Create Hot Spare 52
3.7.2.6 Delete Hot Spare 52
3.7.2.7 Raid Set Information 53
3.7.3 Volume Set Function 53
3.7.3.1 Create Volume Set 54
• Volume Name 56
• Raid Level 56
• Capacity 57
• Strip Size 57
• SCSI Channel 58
• SCSI ID 58
• SCSI LUN 59
• Cache Mode 59
• Tag Queuing 59
3.7.3.2 Delete Volume Set 60
3.7.3.3 Modify Volume Set 61
• Volume Growth 62
• Volume Set Migration 62
3.7.3.4 Check Volume Set 63
3.7.3.5 Stop Volume Set Check 63
3.7.3.6 Display Volume Set Info. 64
3.7.4 Physical Drives 65
3.7.4.1 View Drive Information 65
3.7.4.2 Create Pass-Through Disk 66
3.7.4.3 Modify Pass-Through Disk 66
3.7.4.4 Delete Pass-Through Disk 67
3.7.4.5 Identify Selected Drive 67
3.7.5 Raid System Function 68
3.7.5.1 Mute The Alert Beeper 68
3.7.5.2 Alert Beeper Setting 69
3.7.5.3 Change Password 69
3.7.5.4 JBOD/RAID Function 70
3.7.5.5 Background Task Priority 71
3.7.5.6 Maximum SATA Mode 71
3.7.5.7 Disk Write Cache Mode 72
3.7.5.8 Capacity Truncation 72
3.7.5.9 Controller Fan Detection 73
3.7.5.10 HDD SMART Status Polling 74

3.7.6 Ethernet Configuration (12/16/24 ports)..... 74
3.7.6.1 DHCP Function 75
3.7.6.2 Local IP address 75
3.7.6.3 Ethernet Address..... 76
3.7.7 View System Events 77
3.7.8 Clear Events Buffer..... 77
3.7.9 Hardware Monitor..... 77
3.7.10 System Information 78
4. Driver Installation 79
4.1 Creating the Driver Diskettes..... 79
4.2 Driver Installation for Windows 80
4.2.1 New Storage Device Drivers in Windows Server 2003..... 80
4.2.2 Install Windows 2000/XP/2003 on a SATA RAID Volume .. 81
4.2.2.1 Installation procedures..... 81
4.2.2.2 Making Volume Sets Available to Windows System 82
4.2.3 Install controller into an existing Windows 2000/XP/2003 83
4.2.3.1 Making Volume Sets Available to Windows System 84
4.2.4 Uninstall controller from Windows 2000/XP/2003..... 85
4.3 Driver Installation for Linux 86
4.4 Driver Installation for FreeBSD..... 86
5. Installation ArcHttp Proxy Server..... 88
5.1 For Windows 88
5.2 For Linux 89
6. Web Browser-based Configuration 91
6.1 Start-up McRAID Manager for Local Administration 91
6.1.1 For Windows..... 92
6.1.2 For Linux..... 94
6.2 Start-up McRAID Manager for Remote Administration..... 94
6.2.1 Microsoft Windows System 94
6.2.2 Linux System..... 95
6.3 SATA RAID controller McRAID storage manager..... 95
6.4 Main Menu 96
6.5 Quick Function..... 97
6.6 RaidSet Functions 98
6.6.1 Create Raid Set 98
6.6.2 Delete Raid Set..... 98
6.6.3 Expand Raid Set..... 99
6.6.4 Activate Incomplete Raid Set 99
6.6.5 Create Hot Spare 100
6.6.6 Delete Hot Spare..... 101
6.6.7 Rescue Raid Set 101

6.7 Volume Set Functions 101
6.7.1 Create Volume Set 102
• Volume Name 102
• Capacity 102
• Raid Level 102
• Strip Size 103
• Cache Mode 103
• SCSI Channel/SCSI ID/SCSI Lun 103
• Tag Queuing 103
6.7.2 Delete Volume Set 103
6.7.3 Modify Volume Set 104
6.7.3.1 Volume Set Migration 105
6.7.4 Check Volume Set 105
6.7.5 Stop VolumeSet Check 106
6.8 Physical Drive 106
6.8.1 Create Pass-Through Disk 106
6.8.2 Modify Pass-Through Disk 107
6.8.3 Delete Pass-Through Disk 108
6.8.4 Identify Selected Drive 108
6.9 System Controls 109
6.9.1 System Config 109
• System Beeper Setting 109
• Background Task Priority 109
• JBOD/RAID Configuration 109
6.9.2 Ethernet Configuration (12/16/24 ports) 110
6.9.3 Alert by Mail Configuration (12/16/24 ports) 111
6.9.4 SNMP Configuration 112
6.9.5 View Events/Mute Beeper 113
6.9.6 Generate Test Event 113
6.9.7 Clear Events Buffer 113
6.9.8 Modify Password 114
6.9.9 Update Firmware 115
6.10 Information 115
6.10.1 RaidSet Hierarchy 115
6.10.2 System Information 115
6.10.3 Hardware Monitor 116
Appendix A 117
Upgrading Firmware Through McRAID Storage Manager 117
Appendix B 119
Battery Backup Module (BBM) 119
BBM Components 119

BBM Specifications 119
Installation 120
Battery Backup Capacity 120
Operation 120
Changing the Battery Backup Module 121
Appendix C 122
SNMP Operation & Definition 122
Appendix D 125
General Troubleshooting Tips 125
Appendix E 129
Technical Support 129
Glossary 130
2TB 130
Array 130
ATA 130
Auto Reassign Sector 130
Battery Backup Module 131
BIOS 131
Cache 131
Consistency Check 131
Driver 131
Hot Spare 132
Hardware RAID versus Software RAID 132
Hot Swap 132
NVRAM 132
Parity 132
PCI Express 132
PCI-X 133
RAID 133
Rebuild 133
SATA (Serial ATA) 133
SMART 134
SNMP 134
Volume Set 134
Write-back 134
Write-through 134
XOR-Engine 135

1. Introduction

This section briefly describes general overview of SATA RAID Series controller card, ARC-1110/1120/1130/1160/1170 (4/8/12/16/24-port PCI-X SATA RAID Controller) and ARC-1210/1220/1230/1260/1270 (4/8/12/16/24-port PCI-Express SATA RAID Controller).

1.1 Overview

ARC-11xx/12xx Series high-performance PCI bus Card Serial ATA RAID controller supported 4, 8, 12, 16, 24 SATA-II peripheral device on a single controller. With properly configured, SATA controller can provided non-stop services with a high degree of fault tolerance through the use of RAID technology and advanced array management features. The 4/8 port SATA RAID controller is a low-profile PCI cards-Ideal for 1U or 2U rack-mount system. It has the same RAID kernel of its field-proven external RAID controller. Lets bring quickly to stable and reliable RAID controller to the market.

Unparalleled Performance

The array controllers provide reliable data protection for desktops, workstations and servers. They raise the standard higher performance levels with several enhancements including Intel high-performance I/O Processor, a new DDR memory architecture (DDR333) and high performance PCI bus interconnection. SATA RAID 8/12/16/24-port controller with Areca RAID 6 engine buid-in can offer extreme performance RAID 6 function. It can concurrently compute two parity blocks and performance very similar to RAID 5. The controllers default support 128MB ECC DDR333 SDRAM memory. The 12/16/24 ports controllers support one SODIMM socket for upgrading up to 1GB. The controllers use the Marvell 4/8 channels SATA PCI-X controller chip, which can simultaneously communicate with the host system, and read or write data on several drives.

Unsurpassed Data Availability

As storage capacities continue to rapidly increase, user needs greater level of disk drive fault tolerance, which can be implemented without

doubling the investment in disk drives. RAID 1 can provide greater fault tolerance, but needs double disk drives and is too costly for most users to implement on large volume sets. User wants protection of RAID 1 or better with an implementation cost comparable to RAID 5. The RAID 6 can offer fault tolerance greater that RAID 1 or RAID 5 but only consumes capacity of 2 disk drives for distributed parity data. The 8/12/16/24-port RAID controllers provide the highest RAID 6 feature to meet above requirements.

The 4/8/12/16/24-port controllers also provide RAID levels 0, 1, (10), 3, 5, and JBOD RAID configurations. Its high data availability and protection derives from the following capabilities: Online RAID Capacity Expansion, Array Roaming, Online RAID Level / Stripe Size Migration, Dynamic Volume Set Expansion, Global Online Spare, Automatic Drive Failure Detection, Automatic Failed Drive Rebuilding, Disk Hot-Swap, Online Background Rebuilding and Instant Availability/Background Initialization.

During the controller firmware upgrade flash process, it is possible for a problem to occur resulting in corruption of the controller firmware. With our Redundant Flash image feature the controller will revert back to the last known version of firmware and continue operating. This reduces the risk of system failure due to firmware crash.

Easy RAID Management

SATA RAID controller build-in firmware with an embedded terminal emulation that can access via hot key at BIOS boot-up screen. This pre-boot manager utility can use to simplify the setup and management of RAID controller. The controller firmware also contains HTTP browser-based program that can access through the drive ArcHttp Proxy Server function in Windows, Linux and FreeBSD environment. The Web browser-based RAID management allows local and remote to create and modify RAID set, volume set, and monitor RAID status from standard web browser.

1.2 Features

Adapter Architecture

- Intel IOP 80331 I/O processor (ARC-11xx series)
- Intel IOP 80332/IOP80333 I/O processor (ARC-12xx series)
- 64-bit/133MHz PCI-X Bus compatible
- PCI Express X8 compatible
- 128MB DDR333 SDRAM with ECC protection
- One SO-DIMM Socket support DDR333 SDRAM with ECC protection, upgrade to 1GB
- An ECC or non-ECC SDRAM module using X8 or X16 devices
- Support up to 4/8/12/16/24 SATA ll drives
- Write-through or write-back cache support
- Multi-adapter support for large storage requirements
- BIOS boot support for greater fault tolerance
- BIOS PnP (plug and play) and BBS (BIOS boot specification) support
- Areca or Intel R6 supports extreme performance RAID 6 function
- NVRAM for RAID event & transaction log
- Battery backup module (BBM) ready (Depend on M/B)

RAID Features

- RAID level 0, 1, (10), 3, 5, 6 (R6 engine inside) and JBOD
- Multiple RAID selection
- Online Array roaming
- Online RAID level/stripe size migration
- Online capacity expansion volume growth and RAID level migration simultaneously
- Instant availability and background initialization
- Automatic drive insertion / removal detection and rebuilding
- Greater than 2TB per volume set for 64-bit LBA
- Redundant flash image for adapter availability
- Support S.M.A.R.T. NCQ and OOB Staggered Spin-up Capable drives

Monitors/Notification

- System status indication through LED/LCD connector, HDD activity/fault connector, and alarm buzzer
- SMTP support for email notification
- SNMP support for remote notification
- I2C Enclosure Management Ready

RAID Management

- Field-upgradeable firmware in flash ROM
- Ethernet port support on 12/16/24-port

In-Band Manager

- Hot key boot-up McBIOS RAID manager via BIOS
- Support controller's API library for customer to write its own AP
- Support Command Line Interface (CLI)
- Browser-based management utility via ArcHttp Proxy Server
- Single Admin Portal (SAP) monitor utility
- Disk Stress Test (DST) utility for production in Windows

Out-of-Band Manager

- Firmware-embedded Browser-based RAID manager, SMTP manager, SNMP agent, and Telnet function via Ethernet port (for 12/16/24 port Adapter)
- Support controller's API library for customer to write its own AP(for 12/16/24 port Adapter)
- Push Button and LCD display panel

Operating System

- Windows 2000/XP/Server 2003
- Red Hat Linux
- SuSE Linux
- FreeBSD

(For latest supported OS listing visit http://www.areca.com.tw)

Internal PCI-X RAID Card Comparison (ARC-XXXX)					
	1110	1120	1130	1160	1170
Host Bus Type	PCI-X 133MHz				
RAID 6 support	N/A	YES	YES	YES	YES
Cache Memory	128MB	128MB	One SO-DIMM	One SO-DIMM	One SO-DIMM
Drive Support	4 * SATA II	8 * SATA II	12 * SATA II	16 * SATA II	24 * SATA II
Disk Connector	SATA	SATA	SATA	SATA	SATA

Internal PCI-X RAID Card Comparison (ARC-XXXXML)				
	1110ML	1120ML	1130ML	1160ML
Host Bus Type	PCI-X 133MHz			
RAID 6 support	N/A	YES	YES	YES
Cache Memory	128MB	128MB	One SODIMM	One SODIMM
Drive Support	4 * SATA II	8 * SATA II	12 * SATA II	16 * SATA II
Disk Connector	SATA/Multi-lane	SATA/Multi-lane	SATA/Multi-lane	SATA/Multi-lane

Internal PCI-Express RAID Card Comparison (ARC-XXXX)				
	1210	1220	1230	1260
Host Bus Type	PCI-Express X8			
RAID 6 support	N/A	YES	YES	YES
Cache Memory	128MB	128MB	One SODIMM	One SODIMM
Drive Support	4 * SATA II	8 * SATA II	12 * SATA II	16 * SATA II
Disk Connector	SATA	SATA	SATA	SATA

1.3 RAID Concept

1.3.1 RAID Set

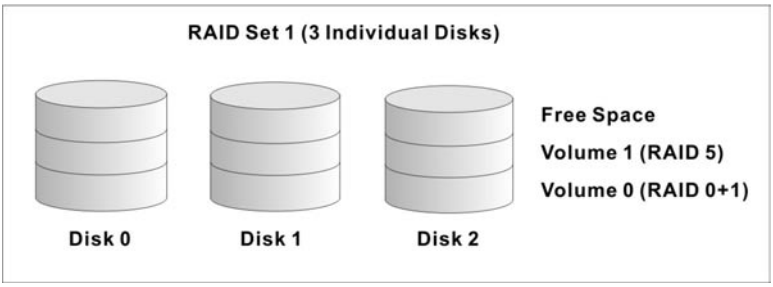
A Raid Set is a group of disk containing one or more volume sets. It has the following features in the SATA RAID controller. A volume Set must be created either on an existing raid set or on a group of available individual disks (disks that are not yet a part of an raid set). If there are pre-existing raid sets with available capacity and enough disks for specified RAID level desired, then the volume set will be created in the existing raid set of the user's choice. If physical disk of different capacity are grouped together in a raid set, then the capacity of the smallest disk will become the effective capacity of all the disks in the raid set.

1.3.2 Volume Set

A Volume Set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a Volume Set. A Volume Set capacity can consume all or a portion

of disk capacity available in a RAID Set. Multiple Volume Sets can exist on a group of disks in a Raid Set.

In the illustration below, Volume 1 can be assigned a RAID 5 level of operation while Volume 0 might be assigned a RAID (10) level of operation.



1.3.3 Easy of Use Features

1.3.3.1 Instant Availability/Background Initialization

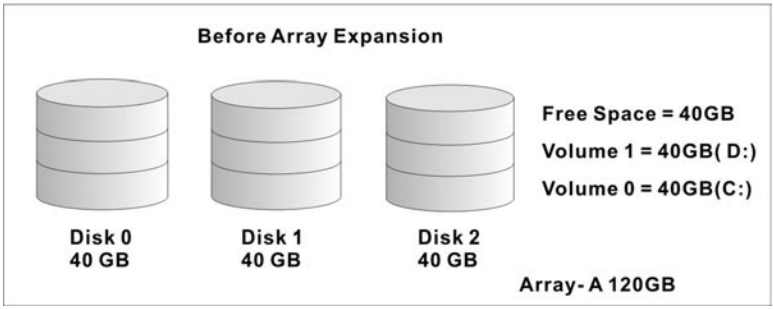
RAID 0 and RAID 1 volume set can be used immediately after the creation. But the RAID 3 and 5 volume sets must be initialized to generate the parity. In the Normal Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. Furthermore, the RAID volume set is also protected against a single disk failure while initialing. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.

1.3.3.2 Array Roaming

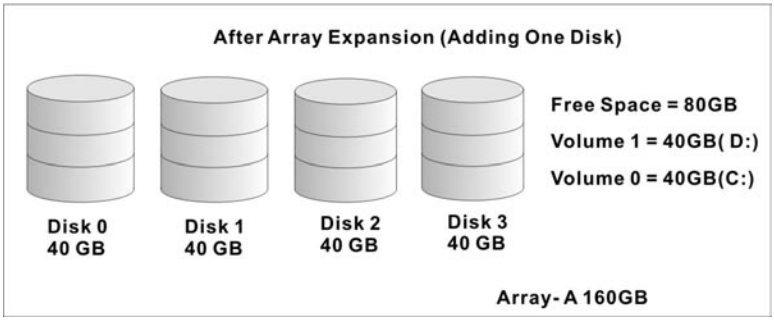
The SATA RAID controller stores configuration information both in NVRAM and on the disk drives It can protect the configuration settings in the case of a disk drive or controller failure. Array roaming allows the administrators the ability to move a completely raid set to another system without losing RAID configuration and data on that raid set. If a server fails to work, the raid set disk drives can be moved to another server and inserted in any order.

1.3.3.3 Online Capacity Expansion

Online Capacity Expansion makes it possible to add one or more physical drive to a volume set, while the server is in operation, eliminating the need to store and restore after reconfigured the raid set. When disks are added to a raid set, unused capacity is added to the end of the raid set. Data on the existing volume sets residing on that raid set is redistributed evenly across all the disks. A contiguous block of unused capacity is made available on the raid set. The unused capacity can create additional volume set. The expansion process is illustrated as following figure.



The SATA RAID controller redistributes the original volume set over the original and newly added disks, using the same fault-tolerance configuration. The unused capacity on the expand raid set can then be used to create an additional volume sets, with a different fault tolerance setting if user need to change.



1.3.4 Online RAID Level and Stripe Size Migration

User can migrate both the RAID level and stripe size of an existing volume set, while the server is online and the volume set is in use. Online RAID level/stripe size migration can prove helpful during performance tuning activities as well as in the event that additional physical disks are added to the SATA RAID controller. For example, in a system using two drives in RAID level 1, you could add capacity and retain fault tolerance by adding one drive. With the addition of third disk, you have the option of adding this disk to your existing RAID logical drive and migrating from RAID level 1 to 5. The result would be parity fault tolerance and double the available capacity without taking the system off.

1.4 High availability

1.4.1 Creating Hot Spares

A hot spare drive is an unused online available drive, which is ready for replacing the failure disk drive. In a RAID level 1, (10), 3, or 5 raid set, any unused online available drive installed but not belonging to a raid set can define as a hot spare drive. Hot spares permit you to replace failed drives without powering down the system. When SATA RAID controller detects a SATA drive failure, the system will automatic and transparent rebuilds using hot spare drives. The raid set will be reconfigured and rebuilt in the background, while the SATA RAID controller continues to handle system request. During the automatic rebuild process, system activity will continue as normal, however, the system performance and fault tolerance will be affected.

Important:

The hot spare must have at least the same capacity as the drive it replaces.

1.4.2 Hot-Swap Disk Drive Support

The SATA RAID controller has built the protection circuit to support the replacement of SATA hard disk drives without having to shut down or reboot the system. The removable hard drive tray can deliver "hot swappable," fault-tolerant RAID solutions at prices much less than the cost of conventional SCSI hard disk SATA RAID controllers. We provide this feature for controllers to provide the advanced fault tolerant RAID protection and "online" drive replacement.

1.4.3 Hot-Swap Disk Rebuild

A Hot-Swap function can be used to rebuild disk drives in arrays with data redundancy such as RAID level 1, (10), 3, and 5. If a hot spare is not available, the failed disk drive must be replaced with a new disk drive so that the data on the failed drive can be rebuilt. If a hot spare is available, the rebuild starts automatically when a drive fails. The SATA RAID controller automatically and transparently rebuilds failed drives in the background with user-definable rebuild rates. The SATA RAID controller will automatically restart the system and the rebuild if the system is shut down or powered off abnormally during a reconstruction procedure condition. When a disk is Hot Swap, although the system is functionally operational, the system may no longer be fault tolerant. Fault tolerance will be lost until the removed drive is replaced and the rebuild operation is completed.

1.5 Understanding RAID

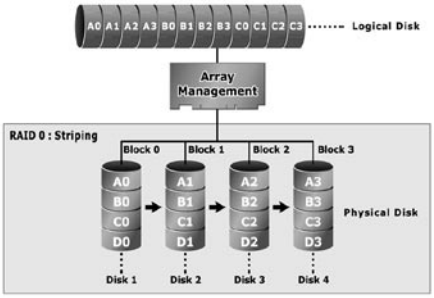
RAID is an acronym for Redundant Array of Independent Disks. It is an array of multiple independent hard disk drives that provide high performance and fault tolerance. The SATA RAID controller implements several levels of the Berkeley RAID technology. An appropriate RAID level is selected when the volume sets are defined or created. This decision is based on disk capacity, data availability (fault tolerance or redundancy), and disk performance. The following is the RAID level, which support in the SATA RAID controller.

The SATA RAID controller makes the RAID implementation and the disks' physical configuration transparent to the host operating system. This means that the host operating system drivers and software

utilities are not affected, regardless of the RAID level selected. Correct installation of the disk array and the controller requires a proper understanding of RAID technology and the concepts.

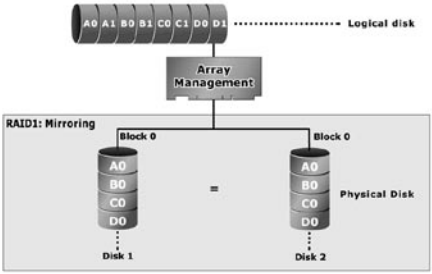
1.5.1 RAID 0

RAID 0, also referred to as striping, writes stripping of data across multiple disk drives instead of just one disk drive. RAID 0 does not provide any data redundancy, but does offer the best high-speed data throughput. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array. Disk striping enhances performance because multiple drives are accessed simultaneously; but the reliability of RAID Level 0 is less than any of its member disk drives due to its lack of redundancy.



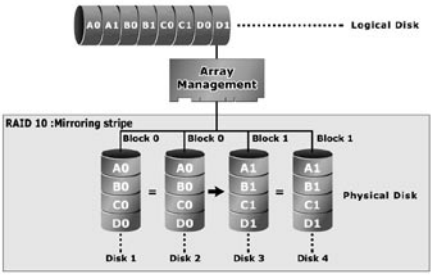
1.5.2 RAID 1

RAID 1 also known as "disk mirroring", data written to one disk drive is simultaneously written to another disk drive. Read performance may be enhanced if the array controller can parallel accesses both members of a mirrored pair. During writes, there will be a minor performance penalty when compared to writing to a single disk. If one drive fails, all data (and software applications) are preserved on the other drive. RAID 1 offers extremely high data reliability, but at the cost of doubling the required data storage capacity.



1.5.3 RAID 10

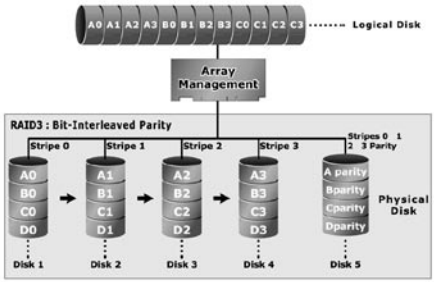
RAID 10 is a combination of RAID 0 and RAID 1, combing stripping with disk mirroring. RAID Level 10 combines the fast performance of Level 0 with the data redundancy of Level 1. In this configuration, data is distributed across several disk drives, similar to Level 0, which are a stripe across a number of mirrored sets for data protection. RAID 10 provides the highest read/write performance of any of the Hybrid RAID levels, but at the cost of doubling the required data storage capacity.



1.5.4 RAID 3

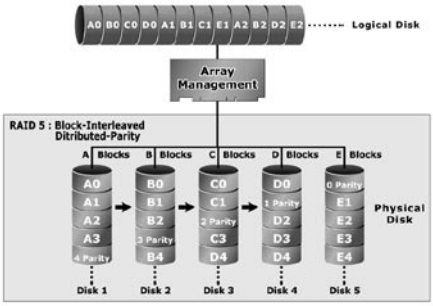
RAID 3 provides disk striping and complete data redundancy though a dedicated parity drive. RAID 3 breaks up data into smaller blocks, calculates parity by performing an exclusive-or on the blocks, and then writes the blocks to all but one drive in the array. The parity data created during the exclusive-or is then written to the last drive in the array. If a single drive fails, data is still available by com-

puting the exclusive-or of the contents corresponding strips of the surviving member disk. RAID-3 is best for applications that require very fast data- transfer rates or long data blocks.



1.5.5 RAID 5

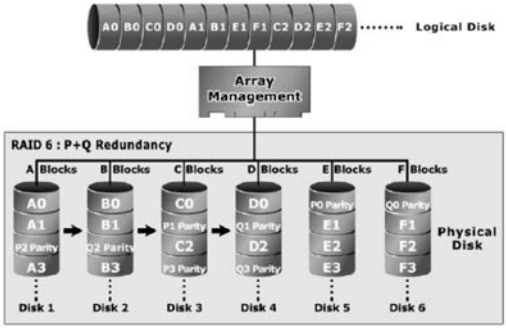
RAID 5 is sometimes called striping with parity at byte level. In RAID 5, the parity information is written to all of the drives in the controllers rather than concentrated on a dedicated parity disk. If one drive in the system fails, the parity information can be used to reconstruct the data from that drive. All drives in the array system can be used to seek operation at the same time, greatly increasing the performance of the RAID system This relieves the write bottle-neck that characterizes RAID 4, and is the primary reason that RAID 5 is more often implemented in RAID arrays.



1.5.6 RAID 6

RAID 6 provides highest reliability, but not widely used. Similar to RAID 5, but does two different parity computations or the same

computation on overlapping subsets of the data. The RAID 6 can offer fault tolerance greater that RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data. RAID 6 is an extension of RAID 5 that uses a second independent distributed parity scheme. Data is striped on a block level across a set of drives, and then a second set of parity is calculated and written across all of the drives.



Summary of RAID Levels

SATA RAID controller supports RAID Levels 0, 1, (10), 3, 5 and 6. Table below provides a summary of RAID levels.

Features and Performance					
RAID Level	Description	Min. Drives	Data Reliability	Data Transfer Rate	I/O Request Rates
0	Also known as stripping Data distributed across multiple drives in the array. There is no data protection	1	No data Protection	Very High	Very High for Both Reads and Writes
1	Also known as mirroring All data replicated on N Separated disks. N is almost always 2. This is a high availability Solution, but due to the 100% duplication, it is also a costly solution.	2	Lower than RAID 6; Higher than RAID 3,5	Reads are higher Than a single disk; Writes similar to a single disk	Reads are twice faster than a single disk; Write are similar to a single disk.
10	Also known Block-Interleaved Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	3	Lower than RAID 6; Higher than RAID 3,5	Transfer rates more similar to RAID 1 than RAID 0	Reads are twice faster than a single disk; Writes are similar to a single disk.
3	Also known Bit-Interleaved Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	3	Lower than RAID 1, (10), 6; Higher than a single drive	Reads are similar to RAID 0; Writes are slower than a single disk	Reads are similar twice faster than a single disk; Writes are similar to a single disk.
5	Also known Block-Interleaved Distributed Parity. Data and parity information is subdivided and distributed across all disk. Parity must be the equal to the smallest disk capacity in the array. Parity information normally stored on a dedicated parity disk.	3	Lower than RAID 1, (10), 6; Higher than a single drive	Reads are similar to RAID 0; Writes are slower than a single disk	Reads are similar to RAID 0; Writes are slower than a single disk.
6	RAID 6 provides highest reliability, but not widely used. Similar to RAID 5, but does two different parity computations or the same computation on overlapping subsets of the data. The RAID 6 can offer fault tolerance greater that RAID 1 or RAID 5 but only consumes the capacity of 2 disk drives for distributed parity data.	4	highest reliability		

2. Hardware Installation

This section describes the procedures for installing ARC-11xx/12xx series.

2.1 Before Your begin Installation

Thanks for purchase SATA RAID Controller as your RAID data storage and management system. This user guide gives simple and step-by-step instructions for installing and configuring your SATA RAID Controller. To ensure your personal safety and protect your equipment and data, carefully read the information that follows the package content list before you begin installing.

Package Contents

If your package is missing any of the items listed below, contact your local dealer before proceeding with installation **(disk drives and disk mounting brackets are not included)**:

ARC-11xx Series SATA RAID Controller

- 1 x PCI-X SATA RAID Controller in an ESD-protective bag
- 4/8/12/16/24 x SATA interface cables (one per port)
- 1 x CD
- 1 x User Manual

ARC-11xxML Series SATA RAID Controller

- 1 x PCI-X SATA RAID Controller in an ESD-protective bag
- 1 x CD
- 1 x User Manual

ARC-12xx Series SATA RAID Controller

- 1 x PCI-Express SATA RAID Controller in an ESD-protective bag
- 4/8/12/16/24 x SATA interface cables (one per port)
- 1 x Installation CD
- 1 x User Manual

2.2 Board Layout

Follow the instruction below to install a PCI RAID Card into your PC/ Server.

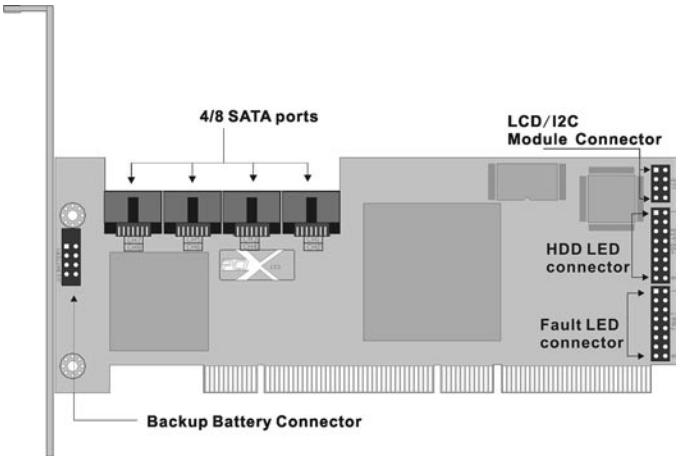


Figure 2-1 ARC-1110/1120 (4/8-port PCI-X SATA RAID Controller)

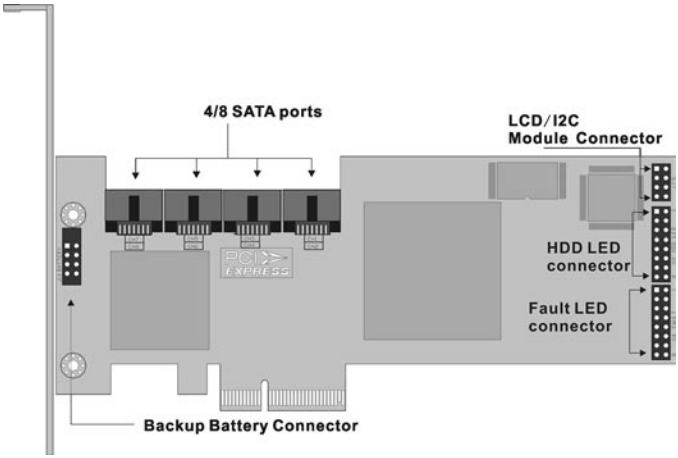


Figure 2-2 ARC-1210/1220 (4/8-port PCI-Express SATA RAID Controller)

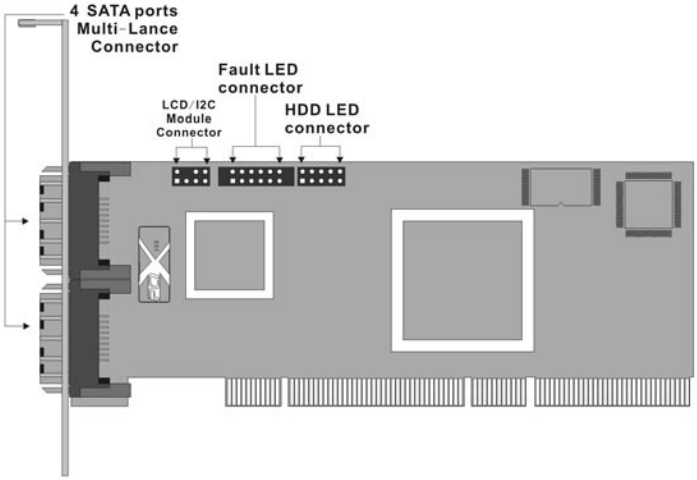


Figure 2-3 ARC-1100ML/1120ML (4/8-port PCI-X SATA RAID Controller)

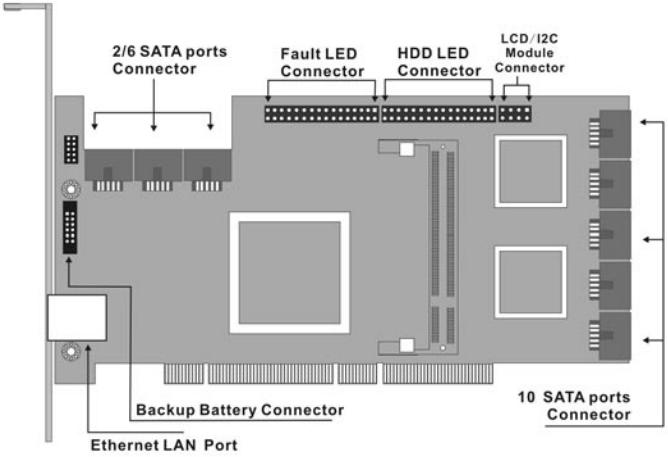


Figure 2-4 ARC-1130/1160 (12/16-port PCI-X SATA RAID Controller)

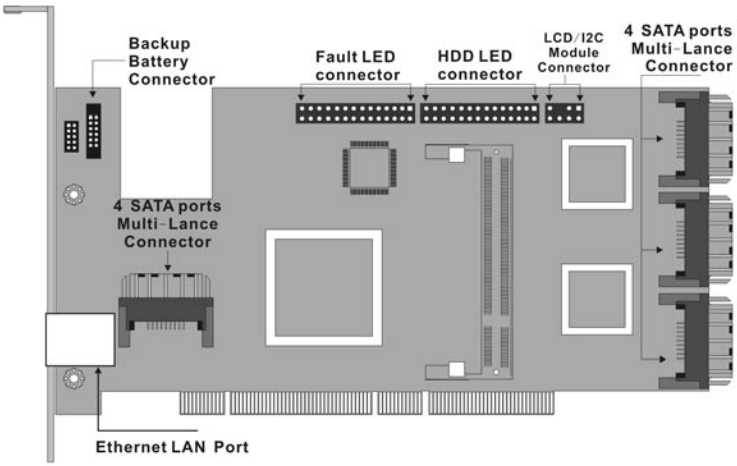


Figure 2-5 ARC-1130ML/1160ML (12/16-port PCI-X SATA RAID Controller)

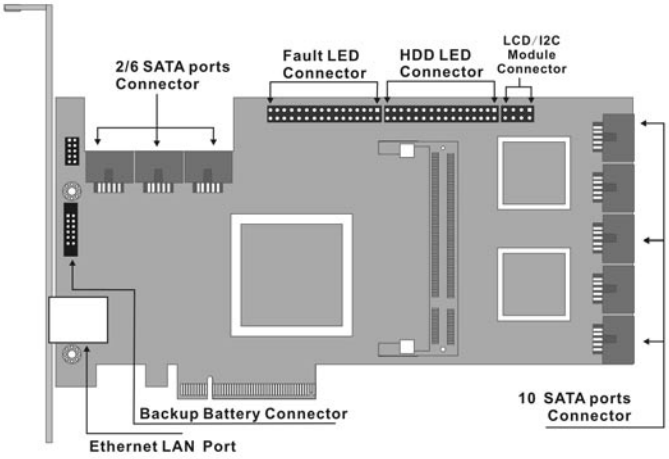


Figure 2-6 ARC-1230/1260 (12/16-port PCI-EXpress SATA RAID Controller)

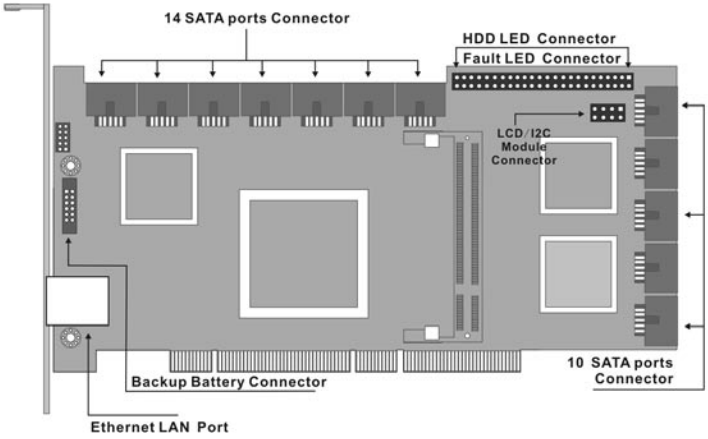


Figure 2-5 ARC-1170 (24-port PCI-X SATA RAID Controller)

Tools Required

An ESD grounding strap or mat Standard hand tools to open your system's case and install the SATA RAID Controller into an available PCI expansion slot.

System Requirement

The controller can be installed in a universal PCI slot and requires a motherboard that:
ARC-11xx series
• Complies with the PCI Revision 2.3 32/64-bit 33/66MHz, 3.3V.
• Complies with the PCI-X 32/64-bit 66/100/133 MHz, 3.3V.
ARC-12xx series
• Complies with the PCI-Express X8
• The SATA RAID controller may be connected to up to 4, 8, 12, 16, and 24 SATA ll hard drives by the supplied cables.
• An optional cables to connect the drive activity LED and fault LED on the enclosure to the PCI SATA RAID controller.

Installation Tools

The following items may be needed to assist with installing the

SATA RAID adapter into an available PCI expansion slot.
• Small screwdriver
• Host system hardware manuals and manuals for disk or enclosure being installed.

Personal Safety Information

To ensure you personal safety, as well as the safety of your equipment:
• Always wear a grounded strap or work on an ESD-protective mat.
• Before opening the system cabinet, turn off power switches and unplug the power cords. Do no reconnect the power cords until you have replaced the covers.

Warning:

High voltages may be found inside computer equipment. Before installing any of the hardware in this package or removing the protective covers of any computer equipment, turn off power switches and disconnect power cords. Do not reconnect the power cords until you have replaced the covers.

Electrostatic Discharge

Static electricity can be a serious danger to the electronic components on this SATA RAID adapter. To avoid damage caused by electrostatic discharge, observe the following precautions:
• Don't remove the SATA RAID controller from its anti-static packaging until you are ready to install it into a computer case.
• Handle the SATA RAID Controller by its edges or by the mounting metal bracket at its two ends.
• Before you handle the SATA RAID controller in any way, touch a grounded, anti-static surface, such as an unpainted portion of the system chassis, for a few seconds to discharge any built-up static electricity.

2.3 Installation

Follow the instruction below to install a PCI RAID Card into your PC/ Server.

Step 1. Unpack

Unpack and remove the PCI RAID card from the package. Inspect it carefully, if anything is missing or damaged, contact your local dealer.

Step 2. Power PC/Server Off

Turn off computer and remove the AC power cord. Remove the system's cover. See the computer system documentation for instruction.

Step 3. Install the PCI RAID Cards

To install the SATA RAID adapter, remove the mounting screw and existing bracket from the rear panel behind the selected PCI slot. Align the gold-fingered edge on the card with the selected PCI expansion slot . Press down gently but firmly to ensure that the card is properly seated in the slot, as shown in Figure 2-4. Then screw the bracket into the computer chassis. The card can fit in both PCI and PCI-X slots. It can get the best performance while the SATA RAID controller runs in the 64-bit/133MHz PCI-X slot.

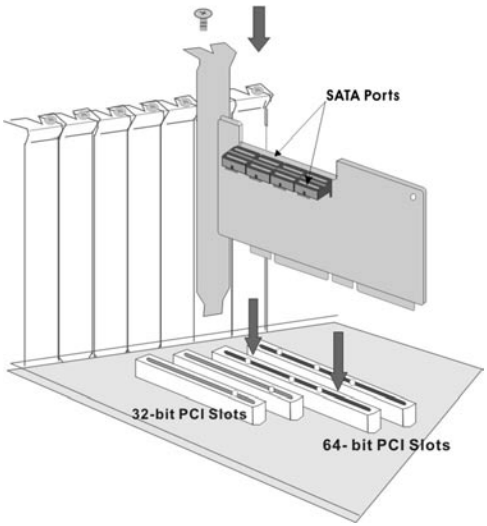
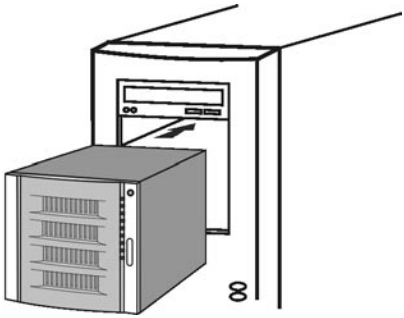


Figure 2-7 Insert PCI RAID Card into a PCI slot

Step 5. Mount the Cages or Drives

Remove the front bezel from the computer chassis and install the Cages or SATA Drives in the computer chassis. Loading drives to the drive tray if cages are installed. Be sure that the power is connected to either the Cage backplane or the individual drives.

Figure 2-8 Mount Cages & Drives



Step 6 Connect the SATA cable

Model ARC-11XX and ARC-12XX have dual-layer SATA internal connector. If you have not already connected your SATA cables, use the cables included with your kit to connect your controller to the SATA hard drives.
The cable connectors are all identical, so it does not matter which end you connect to your controller or SATA hard drive or cage backplane SATA connector.

Figure 2-9 SATA Cable

Step 6-2. Connect the Multi-lance cable

Model ARC-11XX-ML have multi-lance internal connector, each of which can support up to four SATA drives. These adapters can be installed in a server RAID enclosure with InfiniBand 4X connectors (SFF-8470) backplane.
If you have not already connected your Multi-lance cables, use the cables included with your kit to connect your controller to the Multi-lance connector backplane. The cable connectors are all identical, so it does not matter which end you connect to your controller or Multi-lance backplane connector. The following diagram shows the picture of Multi-lane cable.
Unpack and remove the PCI RAID cards. Inspect it carefully. If anything is missing or damaged, contact your local dealer.

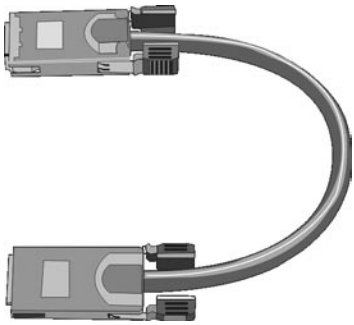


Figure 2-10 Multi-Lance Cable

Step 7 Install the LED cable (optional)

SATA RAID controller provides three kinds of LED status connector.
A: Global indicator connector, which lights when any drive is active.
B: Individual LED indicators connector, for each channel drive.
C: I2C connector, for SATA proprietary backplane enclosure.
The following diagram and discription will show each type of connector.

Note:

A cable for the global indicator comes with your computer system. Cables for the individual drive LEDs may come with a drive cage, or you may need to purchase them.

A: Global Indicator Connector

If your system wants to show the global LED in a two-pin LED drive activity connector, use the fist two pin of the activity LED connector. The following diagram shows the connector and setting.

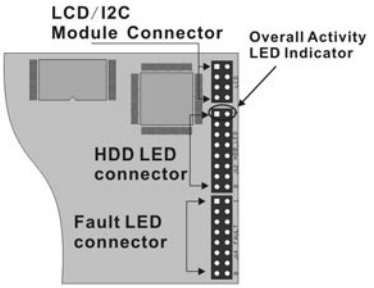


Figure 2-11, ARC-1110/1120/1210/1220 global LED connection for Computer Case.

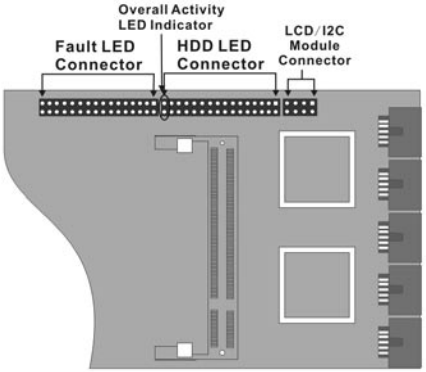


Figure 2-12, ARC-1130/1160/1230/1260 global LED connection for Computer Case.

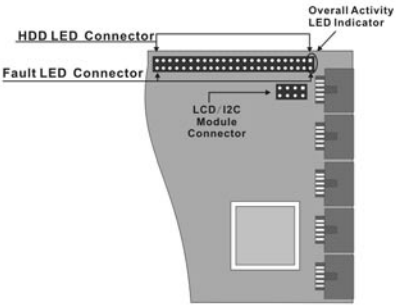


Figure 2-13, ARC-1170/1270 global LED connection for Computer Case.

B: Individual LED indicators connector

Insert the cable from drive activity LED or fault LED connector on backplane of cage to the respective connector on the SATA RAID controller. The following table illustrate the fault/activity LED.

LED	Normal Status	Problem Indication
Disk Activity	When the activity LED is illuminated, there is I/O activity on that disk drive. When the LED is dark, there is no activity on that disk drive.	N/A
Fault LED	When the fault LED is solid illuminated, there is no disk present.	When the Red LED is slow blinking (2 times/sec), that disk drive has failed and should be hot-swaed immediately. When the Blue LED is illuminated adn Red LED is fast blinking (10 times/sec) there is rebuilding acitivity on that disk drive.

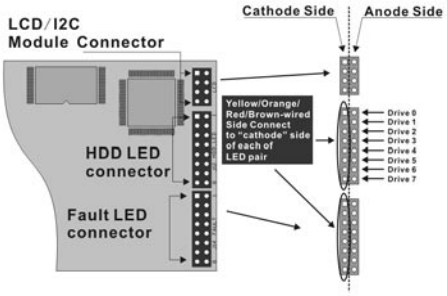


Figure 2-14, ARC-1110/1120/1210/1220 Individual LED indicators connector, for each channel drive.

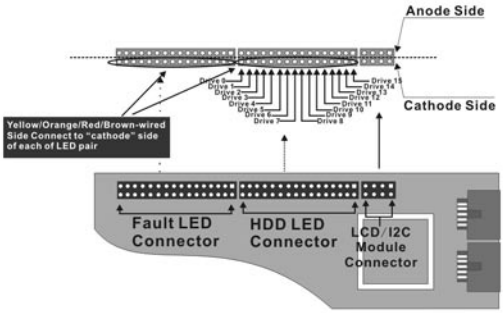
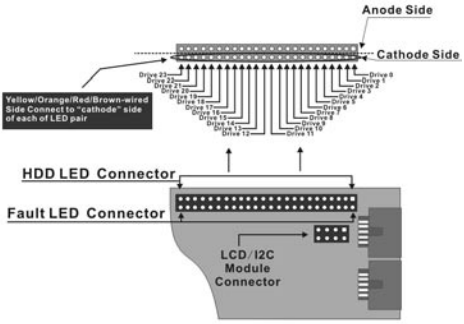


Figure 2-15, ARC-1130/1160/1230/1260 Individual LED indicators connector, for each channel drive.

Figure 2-16, ARC-1170/1270 Individual LED indicators connector, for each channel drive.


Anode Side
Cathode Side
Yellow/Orange/Red/Brown-wired Side Connect to "cathode" side of each of LED pair
HDD LED Connector
Fault LED Connector
LCD/I2C Module Connector

C: I2C Connector

You can also connect the I2C interface to the SATA proprietary backplane enclosure. This can reduce the number of activity LED or fault LED cable. The I2C interface can also cascade to another SATA backplane enclosure for the additional channel status display.

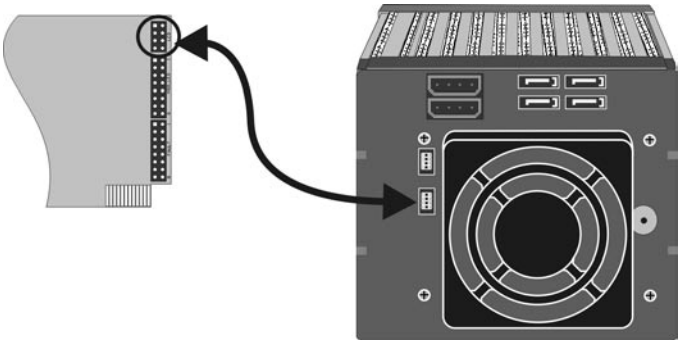


Figure 2-17, Activity LED I2C connector connected between SATA RAID Controller & SATA HDD Cage backplane.

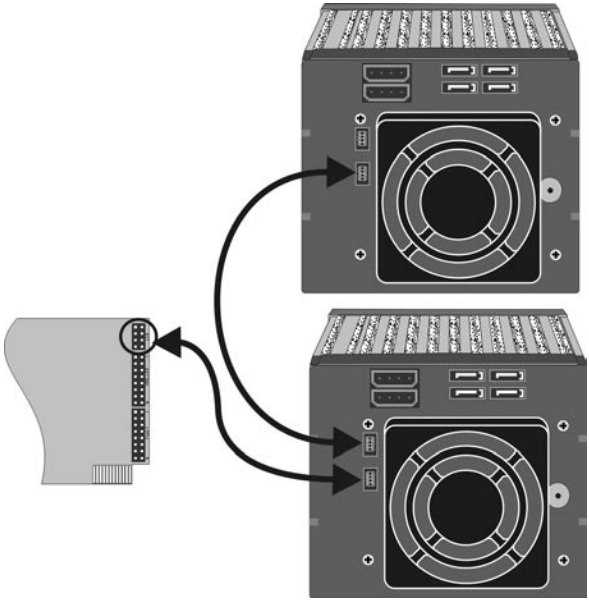


Figure 2-18, Activity LED I2C connector connected between SATA RAID Controller & 2 SATA HDD Cages backplane.

Step 8. Power up the System

Safety checks the installation, reinstall the computer cover and reconnect the power cord cables. Turn on the AC power switch at the rear of the computer then press the power button at the front of the host computer.

Step 9. Configure volume set

The adapter configures the RAID function through the McBIOS RAID manager. Please reference the Chapter 3 **McBIOS RAID Manager** for the detail configuration. The RAID configuration can also be configured by McRAID storage manager. After ArcHttp proxy server be installed. Please refernce the Chapter 6 **Web Browser-Based** Configuration.

Step 10. Install the controller driver

In a new system:

• Driver installation usually takes places as part of operating system installation. Please reference the Chapter 4 Diver Installation

for the detail installation procedure.

In an existing system:

• Install the controller driver to the existing operating system. Please reference the Chapter 4 Driver Installation for the detail installation procedure.

Note:

Look for further release version driver of Linux and FreeBSD:
• See the Driver Library at http://www.areca.com.tw

Step 11. Install ArcHttp proxy Server

The SATA RAID controller firmware has embedded the web-browser RAID manager and SNMP agent function. ArcHttp Proxy driver will enable it. The Browser-based RAID manager provides all of the creation, management, and monitor SATA RAID controller status. Please reference the Chapter 5 for the detail ArcHtt proxy server installation. The SNM agent function please reference appendix C.

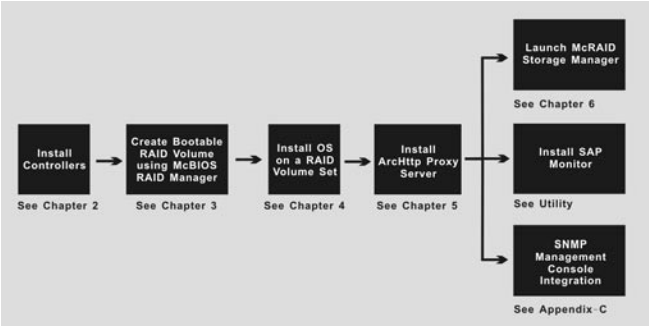
Step 12. Determining the Boot sequences

SATA RAID is a bootable controller. If your system already contains a bootable device with an installed operating system, you can set up your system to boot a second operating system from the new controller. To add a second bootable controller, you may need to enter Setup and change the device boot sequence so that the SATA RAID controller heads the list. If system BIOS Setup does not allow this change, your system may not be configurable to allow the SATA RAID controller to act as a second boot device.

Summary Of the installation

The flow chart below describes the installation procedures for SATA RAID controller. These procedures included hardware installation, the creation and configuration of a RAID volume through the McBIOS, OS installation and installation of SATA RAID controller software.

Configuration Utility	Operating System supported
McBIOS RAID Manager	OS-Independent
McRAID Storage Manager (Via Archttp proxy server)	Windows 2000/XP/2003, Linux and FreeBSD
SAP Monitor (Single Admin portal to scan for multiple RAID units in the network, Via ArcHttp Proxy Server)	Windows 2000/XP/2003 Java based for Windows. Linux and FreeBSD (available in Q2, 2005)
SNMP Manager Console Integration (Via ArcHttp Proxy Server)	Windows 2000/XP/2003, Linux. FreeBSD (available in Q2, 2005)



The software components configure and monitor the SATA RAID controller via ArcHttp Proxy Server.

McRAID Storage Manager

Launching the Firmware-embedded web browser McRAID Storage manager, you need first to install the ArcHttp Proxy Server in your server system. If you need additional information about installation and start-up the function, see the McRAID Storage Manager section in the chapter 6.

SNMP Manager Console Integration

Launching the Firmware-embedded SNMP agent, you need first to install the ArcHttp Proxy Server in your server system. If you need additional information about installation and start-up the function, see the SNMP operation & Installation section in the Appendix-C.

Single Admin Portal (SAP) Monitor

Scan for multiple RAID units in the network and monitor the controller set status. It also includes disks stress test utility to kick out disks meeting marginal spec before the RAID unit is actually put on-line for real business.

For additional information, see the Utility manual in the package CD-ROM or download from the web site http://www.areca.com.tw.

3. McBIOS RAID Manager

The mainboard BIOS automatically configures the SATA RAID controller parameter at power-up;

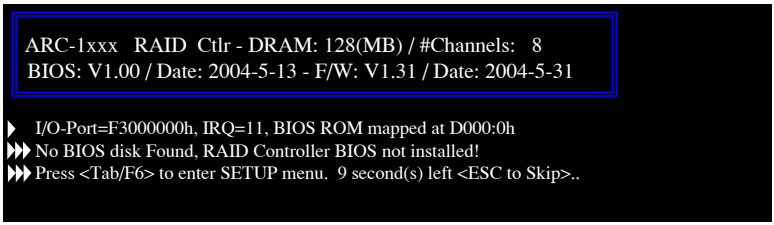
- I/O Port Address
- Interrupt channel(IRQ)
- Adapter ROM Base Address

Use McBIOS to further configure the SATA RAID adapter to suit your operating system.

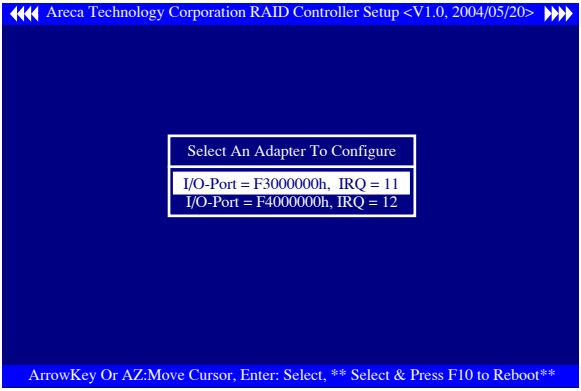
3.1 Starting the McBIOS RAID Manager

This section explains how to use the McBIOS Setup Utility to configure your RAID system. The BIOS Setup Utility is designed to be user-friendly. It is a menu-driven program, residing in the firmware, which allows you to scroll through its various sub-menus and select among the predetermined choices.

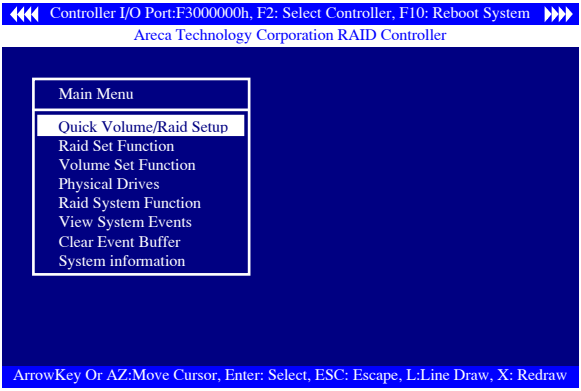
When starting the system with an SATA RAID controller installed, the start-up sequence displays the following message appears on your monitor:


ARC-1xxx RAID Ctlr - DRAM: 128(MB) / #Channels: 8
BIOS: V1.00 / Date: 2004-5-13 - F/W: V1.31 / Date: 2004-5-31
I/O-Port=F3000000h, IRQ=11, BIOS ROM mapped at D000:0h
No BIOS disk Found, RAID Controller BIOS not installed!
Press <Tab/F6> to enter SETUP menu. 9 second(s) left <ESC to Skip>..

The McBIOS configuration manager message remains on your screen for about nine seconds, giving you time to start the configure menu by pressing **Tab** or **F6**. If you do not wish to enter configuration menu, press <**ESC**> to skip configuration. When activated, the McBIOS window appears showing a selection dialog box listing the SATA RAID controller that are installed in the system. The legend at the bottom of the screen shows you what keys are enabled for the windows.


Areca Technology Corporation RAID Controller Setup <V1.0, 2004/05/20>
Select An Adapter To Configure
I/O-Port = F3000000h, IRQ = 11
I/O-Port = F4000000h, IRQ = 12
ArrowKey Or AZ:Move Cursor, Enter: Select, ** Select & Press F10 to Reboot**

Use Up and Down arrow keys to select the adapter you want to configure. While a desired adapter is highlighted, press the <**Enter**> key to enter the Main Menu of the McBIOS Configuration Utility.


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Quick Volume/Raid Setup
Raid Set Function
Volume Set Function
Physical Drives
Raid System Function
View System Events
Clear Event Buffer
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

3.2 McBIOS Configuration manager

The McBIOS configuration utility is firmware-based and uses to configure raid sets and volume sets. Because the utility resides in the SATA RAID controller firmware, its operation is independent of the operating systems on your computer. Use this utility to:

- Create raid set,
- Expand raid set,

- Define volume set,
- Add physical drive,
- Modify volume set,
- Modify RAID level/stripe size,
- Define pass-through disk drives,
- Modify system function, and
- Designate drives as hot spares.

3.3 Configuring Raid Sets and Volume Sets

You can configure raid sets and volume sets with McBIOS RAID manager using Quick Volume/Raid Setup automatically, or Raid Set/Volume Set Function manually configuration method. Each configuration method requires a different level of user input. The general flow of operations for raid set and volume set configuration is:

Step	Action
1	Designate hot spares/pass-through (optional).
2	Choose a configuration method.
3	Create raid sets using the available physical drives.
4	Define volume sets using the space in the raid set.
5	Initialize the volume sets (logical drives) and use volume sets in the host OS.

3.4 Designating Drives as Hot Spares

All unused disk drive that is not part of a raid set can be created as a Hot Spare. The Quick Volume/Raid Setup configuration will automatically add the spare disk drive with the raid level for user to select. For the Raid Set Function configuration, user can use the Create Hot Spare option to define the hot spare disk drive.
A Hot Spare disk drive can be created when you choose the Create Hot Spare option in the Raid Set Function, all unused physical devices connected to the current controller appear:
Select the target disk by clicking on the appropriate check box.
Press the **Enter** key to select a disk drive, and press **Yes** in the Create Hot Spare to designate it as a hot spare.

3.5 Using Quick Volume /Raid Setup Configuration

In Quick Volume /Raid Setup Configuration, it collects all drives in the tray and include them in a raid set. The raid set you create is associated with exactly one volume set, and you can modify the default RAID level, stripe size, and capacity of the volume set. Designating Drives as Hot Spares will also show in the raid level selection option. The volume set default settings will be:

Parameter	Setting
Volume Name	Volume Set # 00
SCSI Channel/SCSI ID/SCSI LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes

The default setting values can be changed after configuration is complete. Follow the steps below to create arrays using Quick Volume /Raid Setup Configuration:

Step	Action
1	Choose **Quick Volume /Raid Setup** from the main menu. The available RAID levels with hot spare for the current volume set drive are displayed.
2	Recommend use drives have same capacity in a specific array. If you use drives with different capacities in an array, all drives in the raid set will select the lowest capacity of the drive in the raid set. The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array. RAID 0 requires 1 or more physical drives RAID 1 requires at least 2 physical drives RAID 1+Spare requires at least 3 physical drives RAID 3 requires at least 3 physical drives RAID 5 requires at least 3 physical drives RAID 3 +Spare requires at least 4 physical drives RAID 5 + Spare requires at least 4 physical drives RAID 6 requires at least 4 physical drives RAID 6 + Spare requires at least 5 physical drives Highlight ***RAID level*** for the volume set and press **Enter** key to confirm.
3	Set the capacity size for the current volume set. After Highlight RAID level and press **Enter** key. The selected capacity for the current volume set is displayed. Using the **UP** and **DOWN** arrow key to create the current volume set capacity size and press **Enter** key to confirm. The available stripe sizes for the current volume set are displayed.

4	Using **UP** and **DOWN** arrow key to select the current volume set stripe size and press **Enter** key to confirm it. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1, 5 or 6 Volume Set. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size provides better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random read requests more often, choose a small stripe size.
5	When you are finished defining the volume set, press **Enter** key to confirm the Quick Volume And Raid Set Setup function.
6	Foreground (Fast Completion) Press **Enter** key to define fast initialization or Selected the Background (Instant Available). In the background Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
7	Initialize the volume set you have just configured
8	If you need to add additional volume set, using main menu Create Volume Set function

3.6 Using Raid Set/Volume Set Function Method

In Raid Set Function, you can use the Create Raid Set function to generate the new raid set. In Volume Set Function, you can use the Create Volume Set function to generate its associated volume set and parameters.
If the current controller has unused physical devices connected, you can choose the Create Hot Spare option in the Raid Set Function to define a global hot spare. Select this method to configure new raid sets and volume sets. The Raid Set/Volume Set Function configuration option allows you to associate volume set with partial and full raid set.

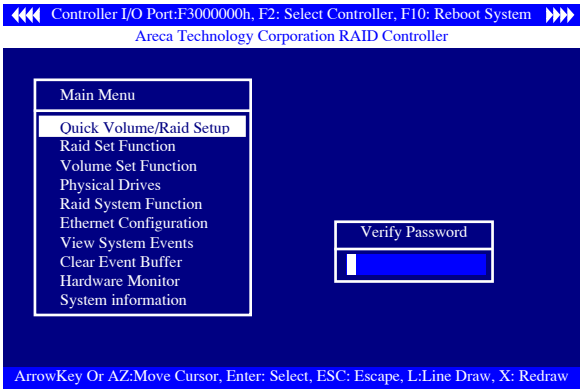
Step	Action
1	To setup the Hot Spare (option), choose **Raid Set Function** from the main menu. Select the **Create Hot Spare** and press **Enter** key to set the Hot Spare.
2	Choose Raid Set Function from the main menu. Select the Create Raid Set and press Enter key.
3	Select a Drive For Raid Set window is displayed showing the IDE drive connected to the current controller.
4	Press **UP** and **DOWN** arrow keys to select specific physical drives. Press the **Enter** key to associate the selected physical drive with the current raid set. Recommend use drives has same capacity in a specific raid set. If you use drives with different capacities in an array, all drives in the raid set will select the lowest capacity of the drive in the raid set. The numbers of physical drives in a specific raid set determine the RAID levels that can be implemented with the raid set. RAID 0 requires 1 or more physical drives per raid set. RAID 1 requires at least 2 physical drives per raid set. RAID 3 requires at least 3 physical drives per raid set. RAID 5 requires at least 3 physical drives per raid set. RAID 6 requires at least 4 physical drives per raid set.
5	After adding physical drives to the current raid set as desired, press Yes to confirm the Create Raid Set function.
6	An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #. Press Enter to finish the name editing.
7	Press **Enter** key when you are finished creating the current raid set. To continue defining another raid set, repeat step 3. To begin volume set configuration, go to step 8.
8	Choose **Volume Set Function** from the Main menu. Select the **Create Volume Set** and press **Enter** key.
9	Choose one raid set from the Create Volume From Raid Set window. Press Enter key to confirm it.
10	Foreground (Fast Completion) Press **Enter** key to define fast initialization or Selected the Background (Instant Available). In the background Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
11	If space remains in the raid set, the next volume set can be configured. Repeat steps 8 to 10 to configure another volume set.

Note:

User can use this method to examine the existing configuration. Modify volume set configuration method provides the same functions as create volume set configuration method. In volume set function, you can use the modify volume set function to modify the volume set parameters except the capacity size:

3.7 Main Menu

The main menu shows all function that enables the customer to execute actions by clicking on the appropriate link.



Note:

The manufacture default password is set at **0000**, this password can be modify by selected the **Change Password** in the section of **Raid System Function**.

Option	Description
Quick Volume/Raid Setup	Create a default configuration which based on numbers of physical disk installed
Raid Set Function	Create a customized raid set
Volume Set Function	Create a customized volume set
Physical Drives	View individual disk information
Raid System Function	Setting the raid system configuration
Ethernet Configuration	Ethernet LAN setting (ARC-1x30/1x60/1x70 only)
View System Events	Record all system events in the buffer
Clear Event Buffer	Clear all event buffer information
Hardware Monitor	Show all system environment status
System Information	View the controller information

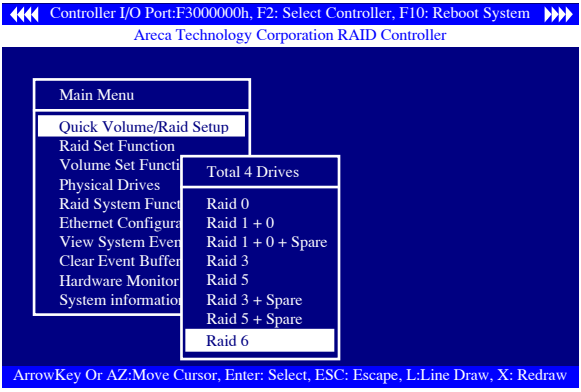
This password option allows user to set or clear the raid controller's password protection feature. Once the password has been set, the user can only monitor and configure the raid controller by providing the correct password. The password is used to protect the internal RAID controller from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The RAID controller will automatically go back to the initial screen when it does not receive any command in twenty seconds.

3.7.1 Quick Volume/RAID Setup

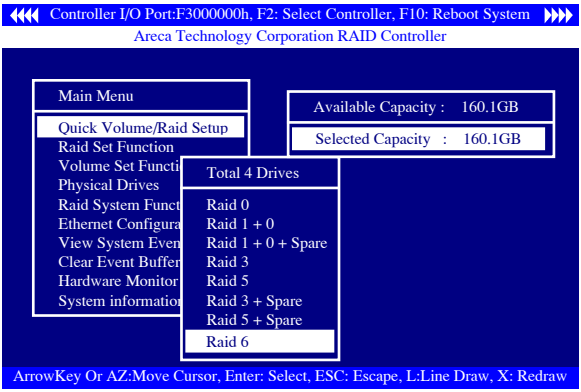
Quick Volume/RAID Setup is the fastest way to prepare a raid set and volume set. It only needs a few keystrokes to complete it. Although disk drives of different capacity may be used in the raid set, it will use the smallest capacity of disk drive as the capacity of all disk drives in the raid set. The Quick Volume/RAID Setup option creates a raid set with the following properties:

1. All of the physical drives are contained in a raid set.
2. The raid levels associated with hot spare, capacity, and stripe size are selected during the configuration process.
3. A single volume set is created and consumed all or a portion of the disk capacity available in this raid set.
4. If you need to add additional volume set, using main menu Create Volume set function.

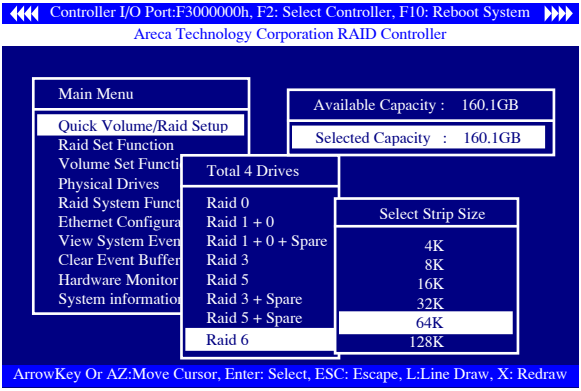
The total physical drives in a specific raid set determine the RAID levels that can be implemented with the raid set. Press the **Quick Volume/RAID Setup** from the main menu; all possible RAID levels screen will be displayed.



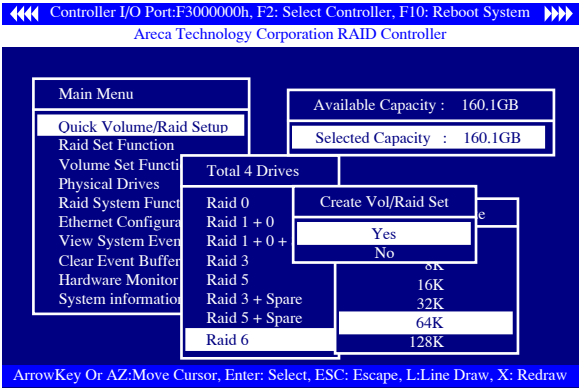
A single volume set is created and consumed all or a portion of the disk capacity available in this raid set. Define the capacity of volume set in the Available Capacity popup. The default value for the volume set is displayed in the selected capacity. To enter a value less than the available capacity, type the value and press the **Enter** key to accept this value. If it only use part of the raid set capacity, you can use the **Create Volume Set** option to define another volume sets



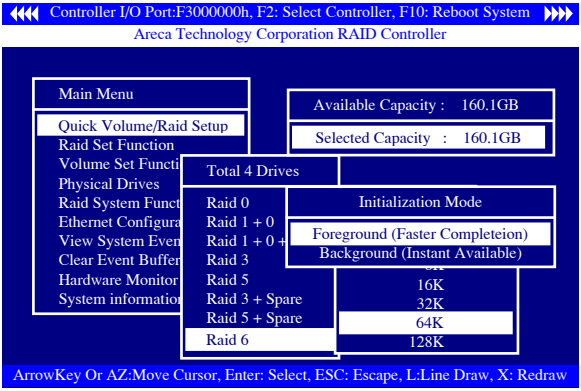
Stripe size This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 3, or 5 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.
A larger stripe size produces better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a small stripe size.



Press the **Yes** key in the Create Vol/Raid Set dialog box, the raid set and volume set will start to initialize it.

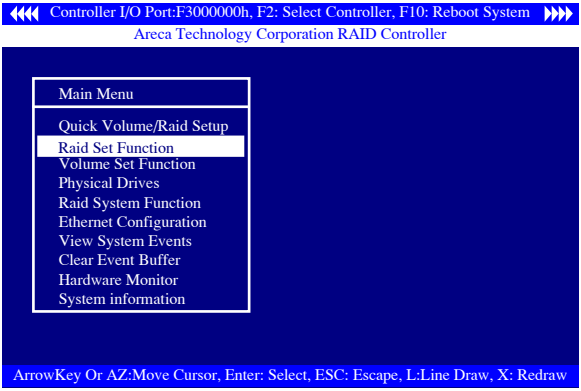


Select Foreground (Faster Completion) or Background (Instant Available) for initialization.



3.7.2 Raid Set Function

User manual configuration can complete control of the raid set setting, but it will take longer to complete than the Quick Volume/Raid Setup configuration. Select the Raid Set Function to manually configure the raid set for the first time or deletes existing raid set and reconfigures the raid set.

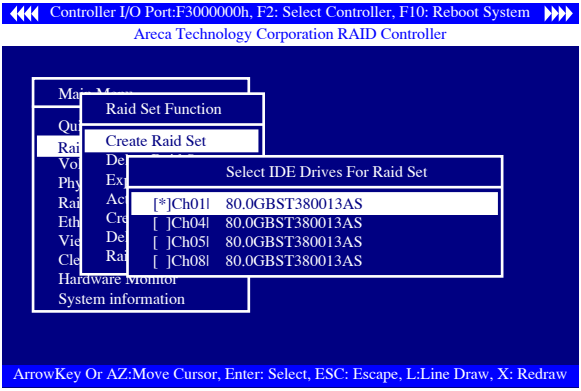


3.7.2.1 Create Raid Set

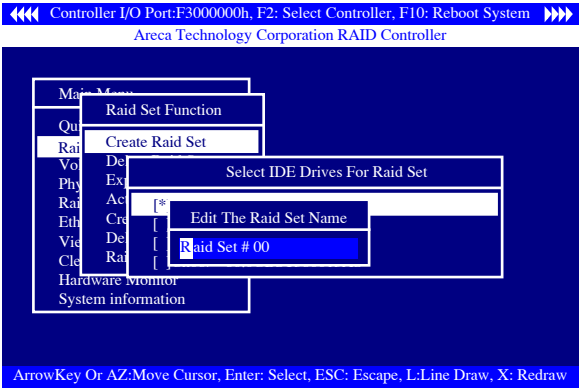
To define raid set, follow the procedure below:

1. Select Raid Set Function from the main menu.
2. Select Create Raid Set option from the Raid Set Function dialog box.
3. A Select IDE Drive For Raid Set window is displayed showing the IDE drive connected to the current controller. Press the **UP** and **DOWN** arrow keys to select specific physical drives. Press the Enter key to associate the selected physical drive with the current raid set. Repeat this step, as many disk drives as user want to add in a single raid set.

To finish selecting IDE drives For Raid Set, press **Esc** key. A Create Raid Set confirmation screen appears, Press **Yes** key to confirm it.

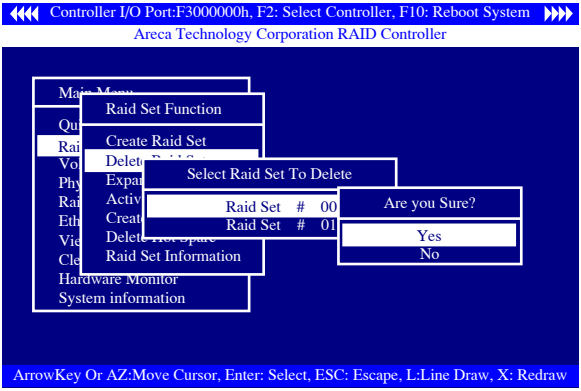

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
Create Raid Set
Select IDE Drives For Raid Set
[*]Ch01| 80.0GBST380013AS
[ ]Ch04| 80.0GBST380013AS
[ ]Ch05| 80.0GBST380013AS
[ ]Ch08| 80.0GBST380013AS
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

4. An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
Create Raid Set
Select IDE Drives For Raid Set
Edit The Raid Set Name
Raid Set # 00
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

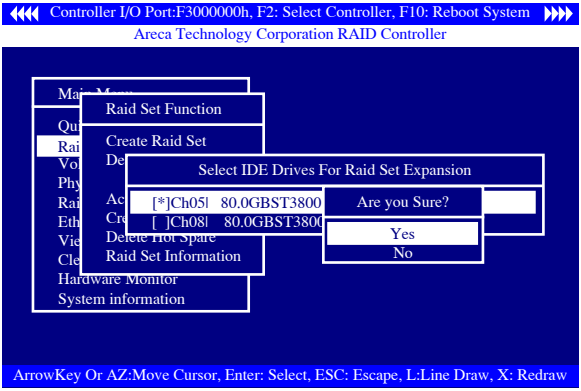
3.7.2.2 Delete Raid Set

To change a raid set, you should first delete it and re-create the raid set. To delete a raid set, select the raid set number that user want to delete in the Select Raid Set to Delete screen. The Delete Raid Set dialog box appears, then press **Yes** key to delete it.


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
Create Raid Set
Select Raid Set To Delete
Raid Set # 00
Raid Set # 01
Are you Sure?
Yes
No
Raid Set Information
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

3.7.2.3 Expand Raid Set

Instead of deleting a raid set and recreating it with additional disk drives, the Expand Raid Set function allows the users to add disk drive to the raid set that was created.

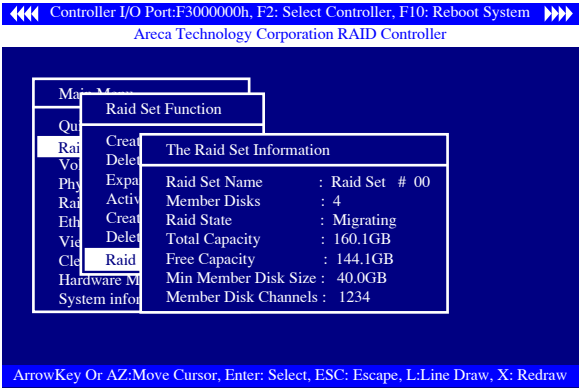

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
Create Raid Set
Select IDE Drives For Raid Set Expansion
[*]Ch05| 80.0GBST3800
[ ]Ch08| 80.0GBST380(
Are you Sure?
Yes
No
Raid Set Information
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

To expand a raid set:
Click on Expand Raid Set option. If there is an available disk, then the Select IDE Drives For Raid Set Expansion screen appears.
Select the target Raid Set by clicking on the appropriate radial button. Select the target disk by clicking on the appropriate check box.
Presses **Yes** key to start expand the raid set.
The new add capacity will be define one or more volume sets. Follow the instruction presented in the Volume Set Function to create the volume set's.

Note:

1. Once the Expand Raid Set process has started, user cannot stop it. The process must be completed.
2. If a disk drive fails during raid set expansion and a hot spare is available, an auto rebuild operation will occur after the raid set expansion completes.

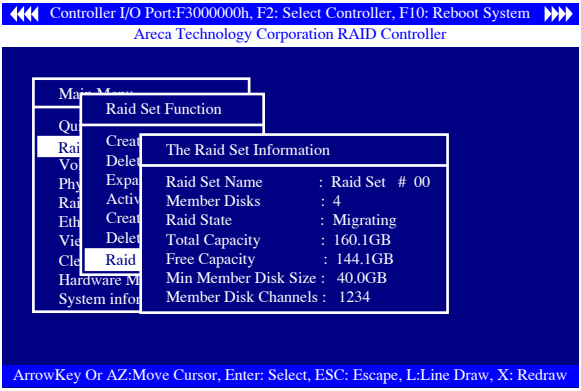
- **Migrating**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
The Raid Set Information
Raid Set Name : Raid Set # 00
Member Disks : 4
Raid State : Migrating
Total Capacity : 160.1GB
Free Capacity : 144.1GB
Min Member Disk Size : 40.0GB
Member Disk Channels : 1234
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

Migrating occurs when a disk is added to a Raid Set. Migration status is displayed in the raid status area of the Raid Set information when a disk is added to a raid set. Migrating status is also displayed in the associated volume status area of the Volume Set Information when a disk is added to a raid set.

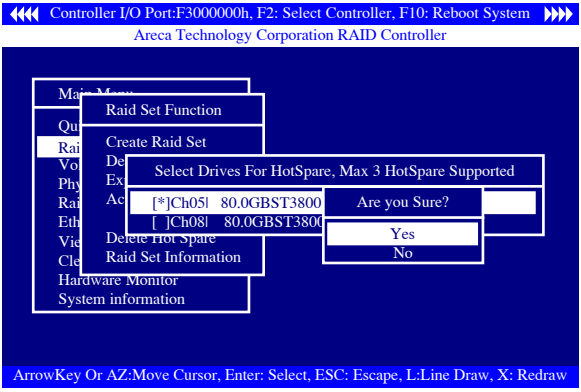
3.7.2.4 Activate Incomplete Raid Set

The following screen is the Raid Set Information after one of its disk drive has removed in the power off state.


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
The Raid Set Information
Raid Set Name : Raid Set # 00
Member Disks : 4
Raid State : Migrating
Total Capacity : 160.1GB
Free Capacity : 144.1GB
Min Member Disk Size : 40.0GB
Member Disk Channels : 1234
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

When one of the disk drive is removed in power off state, the raid set state will change to Incomplete State. If user wants to continue to work, when the SATA RAID controller is power on. User can use the Activate Raid Set option to active the raid set. After user complete the function, the Raid State will change to Degraded Mode.

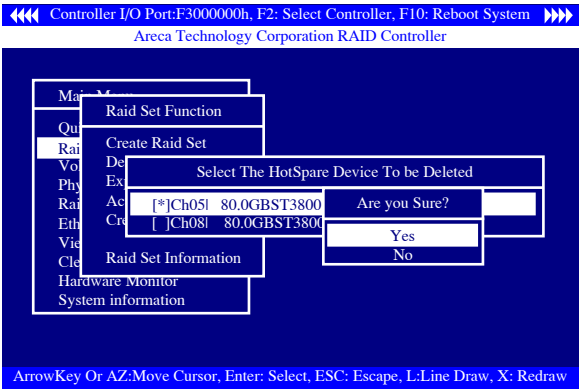
3.7.2.5 Create Hot Spare


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
Create Raid Set
Select Drives For HotSpare, Max 3 HotSpare Supported
[*]Ch05| 80.0GBST3800
[ ]Ch08| 80.0GBST380
Are you Sure?
Yes
No
Raid Set Information
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

When you choose the Create Hot Spare option in the Raid Set Function, all unused physical devices connected to the current controller appear:
Select the target disk by clicking on the appropriate check box.
Press the **Enter** key to select a disk drive and press **Yes** in the Create Hot Spare to designate it as a hot spare.
The create Hot Spare option gives you the ability to define a global hot spare.

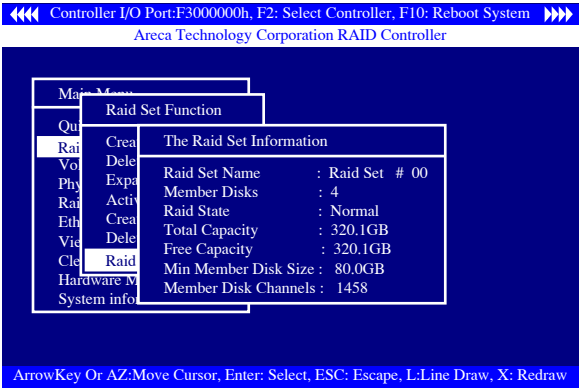
3.7.2.6 Delete Hot Spare

Select the target Hot Spare disk to delete by clicking on the appropriate check box.
Press the **Enter** keys to select a disk drive, and press **Yes** in the Delete Hot Spare to delete the hot spare.

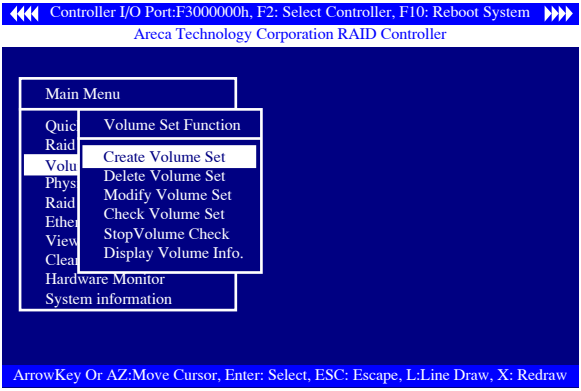

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
Create Raid Set
Select The HotSpare Device To be Deleted
[*]Ch05| 80.0GBST3800
[ ]Ch08| 80.0GBST380
Are you Sure?
Yes
No
Raid Set Information
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

3.7.2.7 Raid Set Information

To display Raid Set information, move the cursor bar to the desired Raid Set number, then press **Enter** key. The Raid Set Information will show as above.
You can only view the information of this Raid Set.


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Raid Set Function
The Raid Set Information
Raid Set Name : Raid Set # 00
Member Disks : 4
Raid State : Normal
Total Capacity : 320.1GB
Free Capacity : 320.1GB
Min Member Disk Size : 80.0GB
Member Disk Channels : 1458
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

3.7.3 Volume Set Function


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create Volume Set
Delete Volume Set
Modify Volume Set
Check Volume Set
StopVolume Check
Display Volume Info.
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

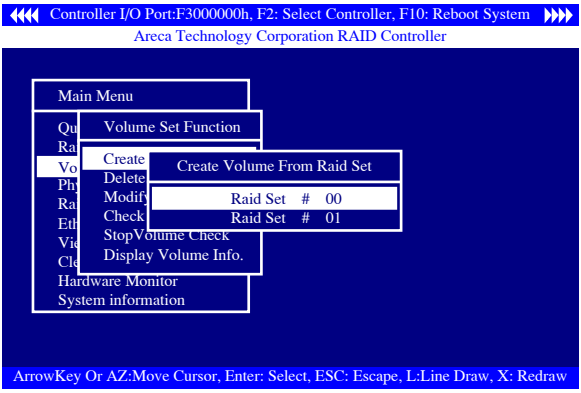
A Volume Set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a Volume Set. A Volume Set capacity can consume all or a portion of the disk capacity available in a Raid Set. Multiple Volume Sets can exist on a group of disks in a Raid Set. Additional Volume Sets created in a specified Raid Set will reside

on all the physical disks in the Raid Set. Thus each Volume Set on the Raid Set will have its data spread evenly across all the disks in the Raid Set.

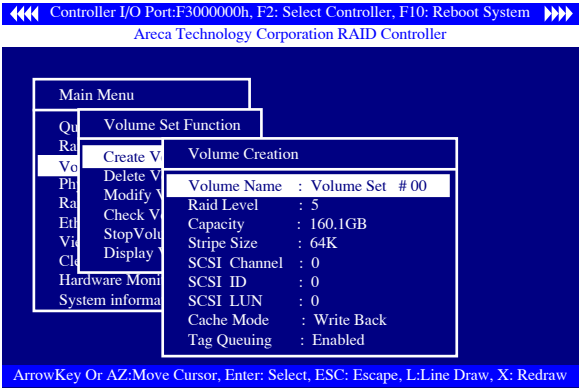
3.7.3.1 Create Volume Set

1. Volume sets of different RAID levels may coexist on the same raid set.
2. Up to 16 volume sets in a raid set can be created by the SATA RAID controller.
3. The maximum addressable size of a single volume set is 2 TB(32-bit mode).

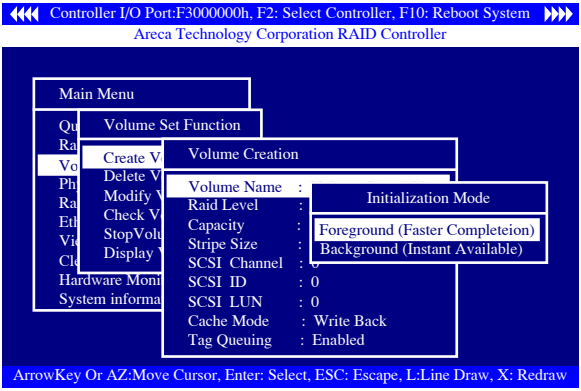
To create a volume set, follow the following steps:
1. Select the Volume Set Function from the Main menu.
2. Choose the Create Volume Set from Volume Set Functions dialog box screen.
3. The Create Volume From Raid Set dialog box appears. This screen displays the existing arranged raid sets. Select the raid set number and press **Enter** key. The Volume Creation is displayed in the screen.



4. A window with a summary of the current volume set's settings. The "**Volume Creation**" option allows user to select the Volume name, capacity, RAID level, strip size, SCSI ID/LUN, Cache mode and tag queuing. User can modify the default values in this screen; the modification procedures are at 3.5.3.3 section.

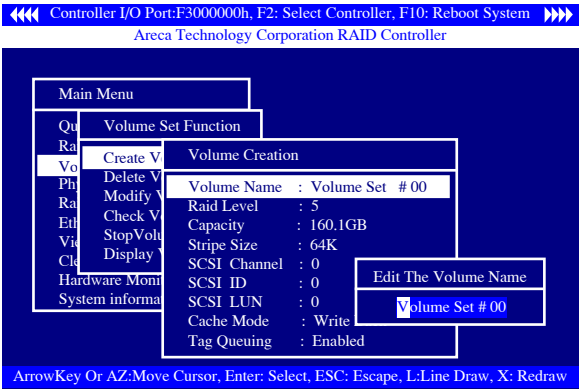

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create V
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

5. After completing the modification of the volume set, press Esc key to confirm it. A Fast Initialization screen is presented.
   - Select Foreground(Fast Completion) for Fast Initialization of the selected volume set.
   - Select Background(Instant Available) for Normal Initialization of the selected volume set.



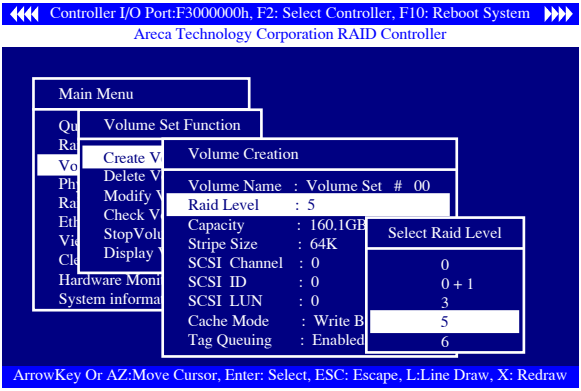
6. Repeat steps 3 to 5 to create additional volume sets.
7. The initialization percentage of volume set will be displayed at the button line.

- **Volume Name**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write
Tag Queuing : Enabled
Edit The Volume Name
Volume Set # 00
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

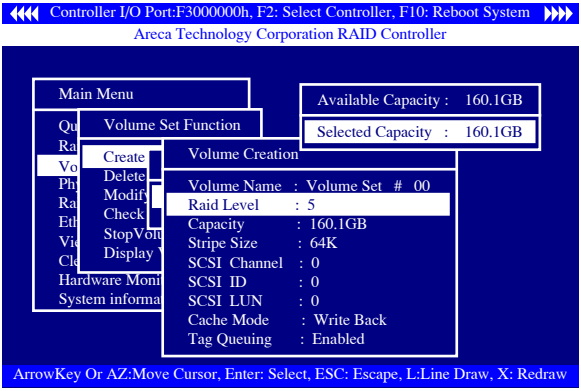
The default volume name will always appear as Volume Set. #. You can rename the volume set name providing it does not exceed the 15 characters limit.

- **Raid Level**



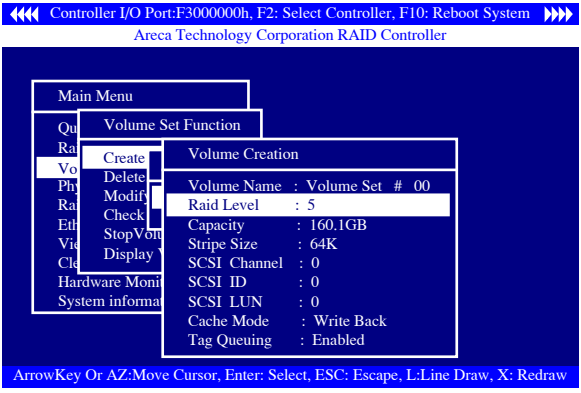
Set the RAID level for the Volume Set. Highlight Raid Level and press <**Enter**>.
The available RAID levels for the current Volume Set are displayed. Select a RAID level and press **Enter** key to confirm.

- **Capacity**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create
Volume Creation
Available Capacity : 160.1GB
Selected Capacity : 160.1GB
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

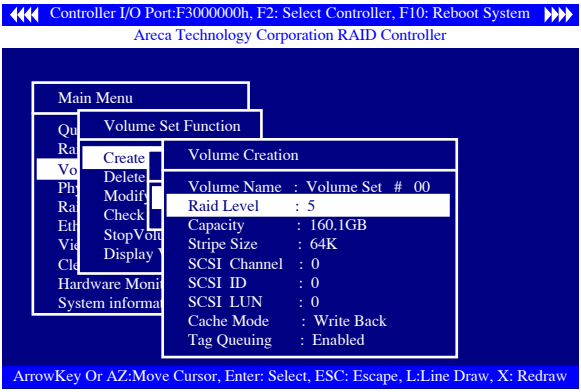
The maximum volume size is default in the first setting. Enter the appropriate volume size to fit your application. The capacity can also increase or decrease by the **UP** and **DOWN** arrow key. Each volume set has a selected capacity which is less than or equal to the total capacity of the raid set on which it resides.

- **Strip Size**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

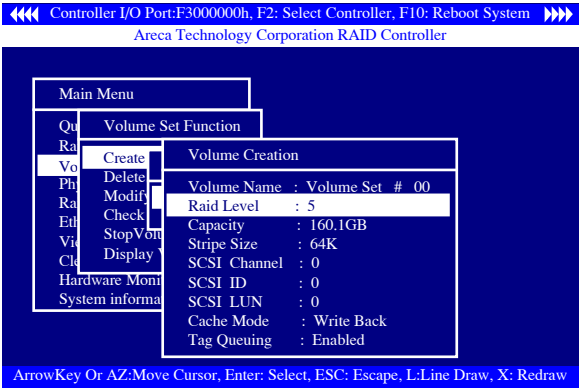
This parameter sets the size of the segment written to each disk in a RAID 0, 1, 3, or 5 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.

- **SCSI Channel**



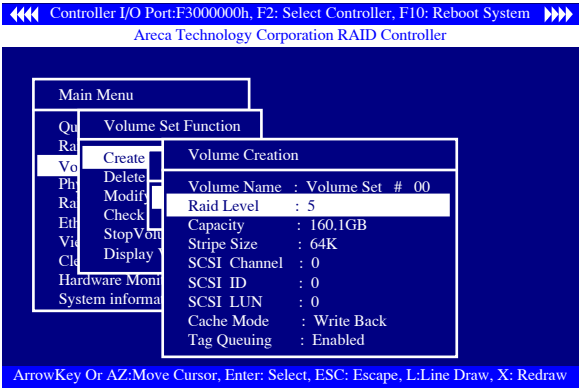
The SATA RAID controller function is simulated to the SCSI RAID controller. The host bus is represented to the SCSI channel. Choose the SCSI Channel. A Select SCSI Channel dialog box appears, select the channel number and press **Enter** key to confirm it.

- **SCSI ID**



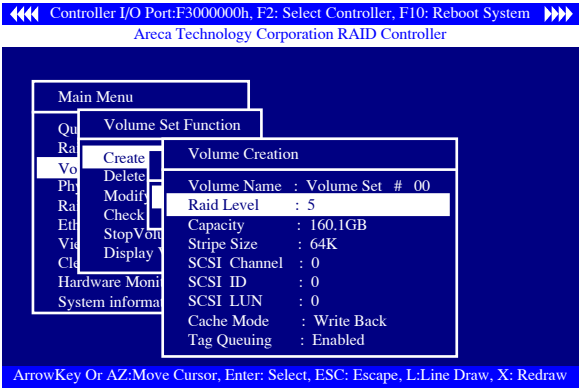
Each SCSI device attached to the SCSI card, as well as the card itself, must be assigned a unique SCSI ID number. A SCSI channel can connect up to 15 devices. The SATA RAID controller is as a lots of large SCSI device. We should assign an ID from a list of SCSI IDs.

- **SCSI LUN**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

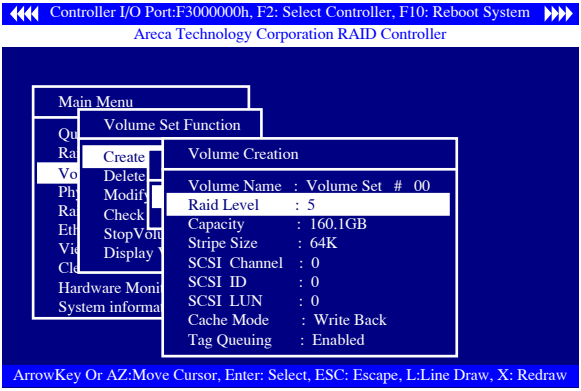
Each SCSI ID can support up to 8 LUNs. Most SCSI controller treats each LUN like a SCSI disk.

- **Cache Mode**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

User can set the cache mode to: Write-Through Cache or Write-Back Cache.

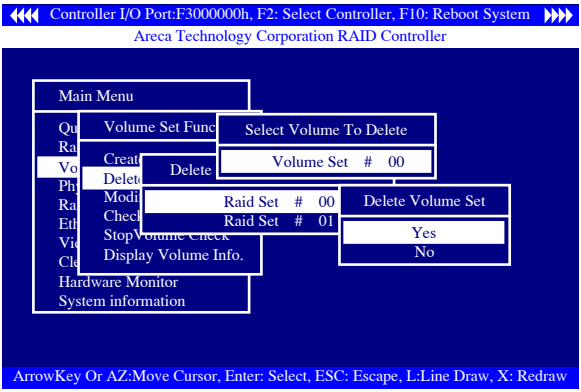
- **Tag Queuing**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create
Delete
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 5
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
Hardware Moni
System informa
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

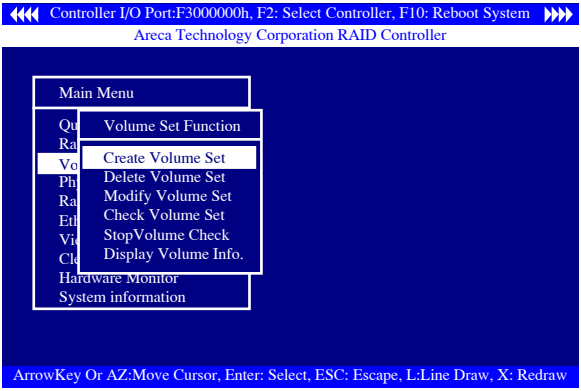
The Enabled option is useful for enhancing overall system performance under multi-tasking operating systems. The Command Tag (Drive Channel) function controls the SCSI command tag queuing support for each drive channel. This function should normally remain enabled. Disable this function only when using older SCSI drives that do not support command tag queuing.

3.7.3.2 Delete Volume Set

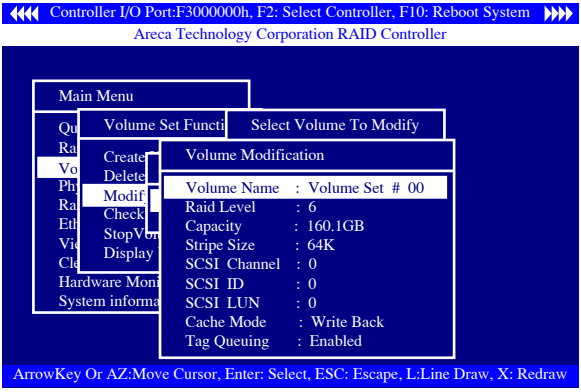
To delete Volume set from raid set system function, move the cursor bar to the Volume Set Functions menu and select the Delete Volume Set item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set # item. Move the cursor bar to an RAID Set number, then press **Enter** key to show all Volume Set # in the raid set. Move cursor to the deleted Volume Set number, press **Enter** key to delete it.



3.7.3.3 Modify Volume Set


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create Volume Set
Delete Volume Set
Modify Volume Set
Check Volume Set
StopVolume Check
Display Volume Info.
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

Use this option to modify volume set configuration. To modify Volume Set values from Raid Set system function, move the cursor bar to the Volume Set Functions menu and select the Modify Volume Set item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set number items. Move the cursor bar to an Raid Set number item, then press **Enter** key to show all Volume Set item Select the Volume Set from the list you which to change, press **Enter** key to modify it.

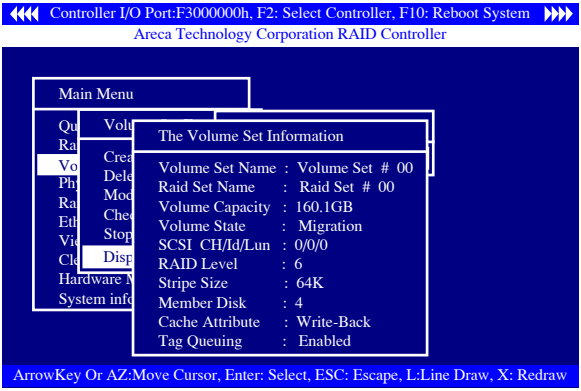

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Functi
Select Volume To Modify
Volume Modification
Volume Name : Volume Set # 00
Raid Level : 6
Capacity : 160.1GB
Stripe Size : 64K
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

As shown in the following can be modified at this screen. Choose this option to display the properties of the selected Volume Set; you can modify all values except the capacity.

- **Volume Growth**

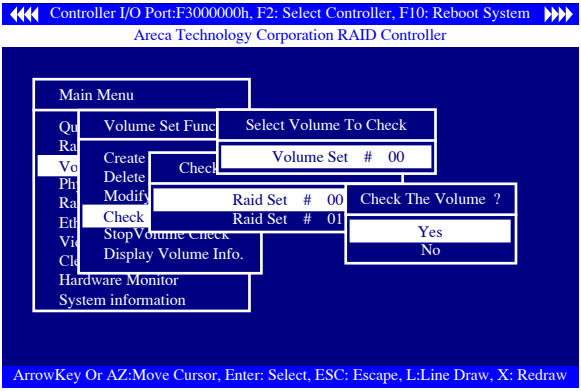
Use this raid set expands to expand a raid set, when a disk is added to your system. The expand capacity can use to enlarge the volume set size or create another volume set. The modify volume set function can support the volume set expansion function. To expand volume set capacity value from raid set system function, move the cursor bar to the volume set volume capacity item and entry the capacity size. Tick on the Confirm The Operation and click on the Submit button to complete the action. The volume set start to expand.

- **Volume Set Migration**


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
The Volume Set Information
Volume Set Name : Volume Set # 00
Raid Set Name : Raid Set # 00
Volume Capacity : 160.1GB
Volume State : Migration
SCSI CH/Id/Lun : 0/0/0
RAID Level : 6
Stripe Size : 64K
Member Disk : 4
Cache Attribute : Write-Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

Migrating occurs when a volume set is migrating from one RAID level to another, a Volume set strip size changes, or when a disk is added to a Raid Set. Migration status is displayed in the volume status area of the Volume Set Information when one RAID level to another, a Volume set strip size changes or when a disk is added to a raid set.

3.7.3.4 Check Volume Set

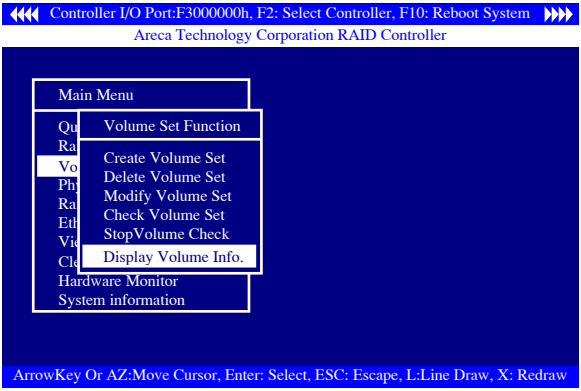


Use this option to verify the correctness of the redundant data in a volume set. For example, in a system with dedicated parity, volume set check means computing the parity of the data disk drives and comparing the results to the contents of the dedicated parity disk drive. To check Volume Set from Raid Set system function, move the cursor bar to the Volume Set Functions menu and select the Check Volume Set item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set number items. Move the cursor bar to an Raid Set number item, then press **Enter** key to show all Volume Set item Select the Volume Set from the list you which to check, press **Enter** key to select it. After completing the selection, the confirmation screen appears, presses **Yes** to start check.

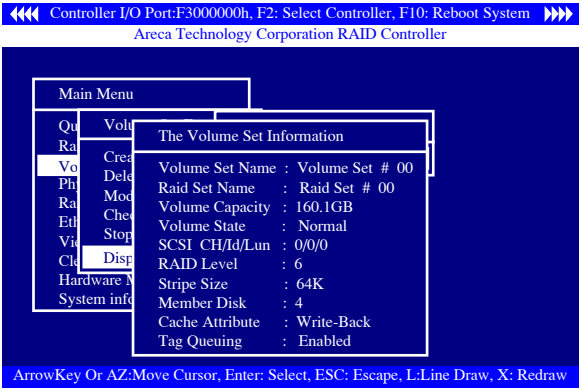
3.7.3.5 Stop Volume Set Check

Use this option to stop all the Check Volume Set function.

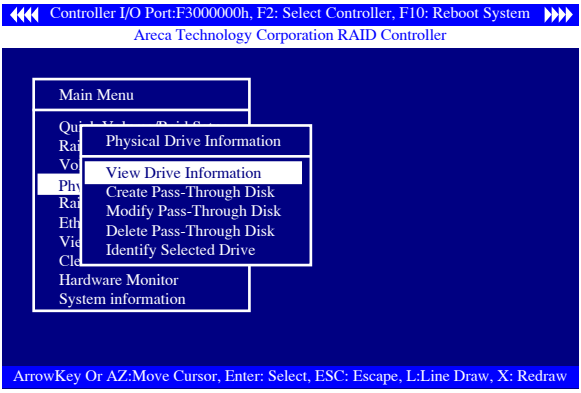
3.7.3.6 Display Volume Set Info.


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Volume Set Function
Create Volume Set
Delete Volume Set
Modify Volume Set
Check Volume Set
StopVolume Check
Display Volume Info.
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

To display Volume Set information, move the cursor bar to the desired Volume Set number, then press **Enter** key. The Volume Set Information will show as following. You can only view the information of this Volume Set.

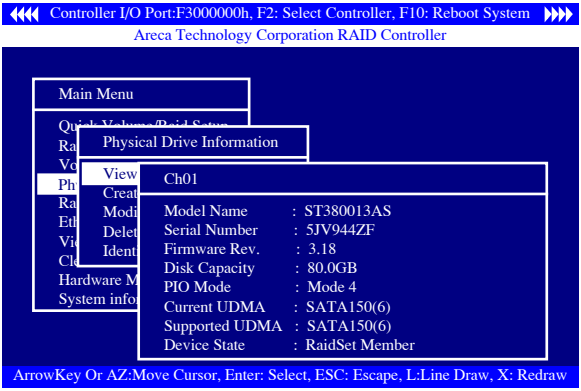

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
The Volume Set Information
Volume Set Name : Volume Set # 00
Raid Set Name : Raid Set # 00
Volume Capacity : 160.1GB
Volume State : Normal
SCSI CH/Id/Lun : 0/0/0
RAID Level : 6
Stripe Size : 64K
Member Disk : 4
Cache Attribute : Write-Back
Tag Queuing : Enabled
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

3.7.4 Physical Drives


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Physical Drive Information
View Drive Information
Create Pass-Through Disk
Modify Pass-Through Disk
Delete Pass-Through Disk
Identify Selected Drive
Hardware Monitor
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

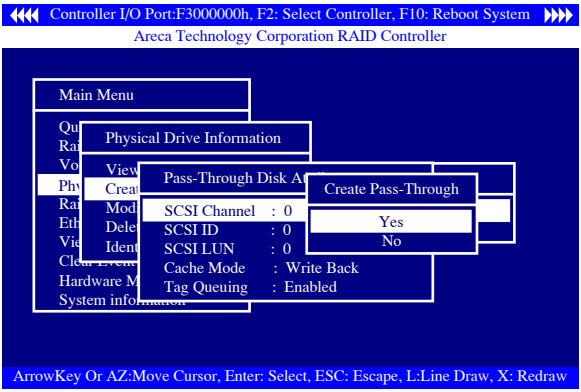
Choose this option from the Main Menu to select a physical disk and to perform the operations listed above.

3.7.4.1 View Drive Information


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Physical Drive Information
Ch01
Model Name : ST380013AS
Serial Number : 5JV944ZF
Firmware Rev. : 3.18
Disk Capacity : 80.0GB
PIO Mode : Mode 4
Current UDMA : SATA150(6)
Supported UDMA : SATA150(6)
Device State : RaidSet Member
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

When you choose this option, the physical disks in the SATA RAID controller are listed. Move the cursor to the desired drive and press **Enter**. The following appears:

3.7.4.2 Create Pass-Through Disk

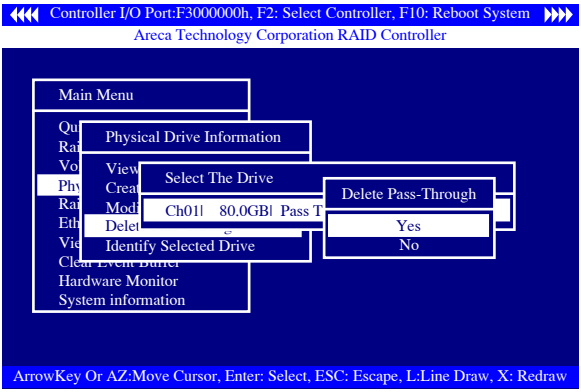

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Physical Drive Information
Pass-Through Disk A
Create Pass-Through
SCSI Channel : 0
SCSI ID : 0
SCSI LUN : 0
Cache Mode : Write Back
Tag Queuing : Enabled
Yes
No
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

Disk is no controlled by the SATA RAID controller firmware and thus cannot be a part of a Volume Set. The disk is available to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the SATA RAID controller firmware. The SCSI Channel, SCSI ID, SCSI LUN, Cache Mode, and Tag Queuing.

3.7.4.3 Modify Pass-Through Disk

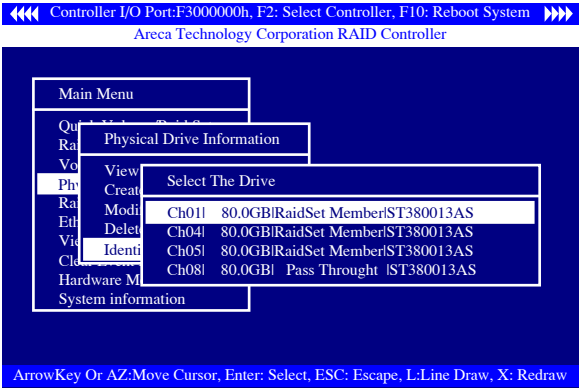
Use this option to modify the Pass-Through Disk Attribute. To modify Pass-Through Disk parameters values from Pass-Through Disk pool, move the cursor bar to the Physical Drive Function menu and select the Modify Pass-Through Drive option and then press **Enter** key. The Physical Drive Function menu will show all Raid Pass-Through Drive number option. Move the cursor bar to a desired item, then press **Enter** key to show all Pass-Through Disk Attribute. Select the parameter from the list you which to change, press **Enter** key to modify it.

3.7.4.4 Delete Pass-Through Disk



To delete Pass-through drive from the Pass-through drive pool, move the cursor bar to the Physical Drive Function menu and select the Delete pass-through drive item, then press **Enter** key. The Delete Pass-Through confirmation screen will appear and press **Yes** key to delete it.

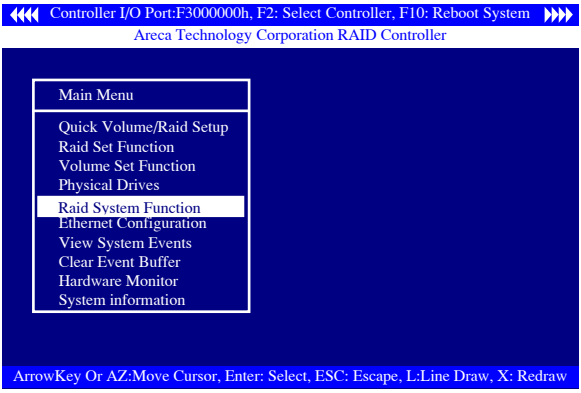
3.7.4.5 Identify Selected Drive


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Physical Drive Information
Select The Drive
Ch01| 80.0GB|RaidSet Member|ST380013AS
Ch04| 80.0GB|RaidSet Member|ST380013AS
Ch05| 80.0GB|RaidSet Member|ST380013AS
Ch08| 80.0GB| Pass Throught |ST380013AS
Hardware M
System information
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

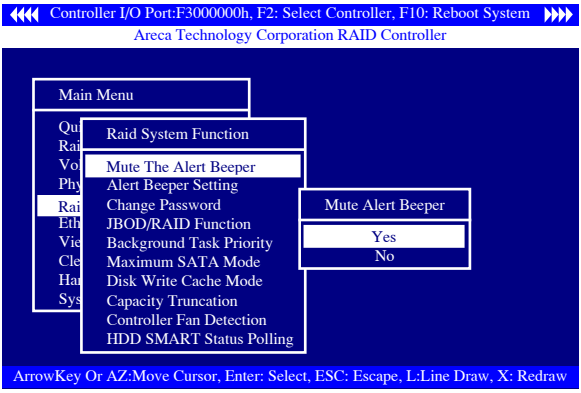
To prevent removing the wrong drive, the selected disk HDD LED Indicator will light for physically locating the selected disk when the Identify Selected Device is selected.

3.7.5 Raid System Function

To set the raid system function, move the cursor bar to the main menu and select the "**Raid System Function**" item and then press **Enter** key. The Raid System Function menu will show all items. Move the cursor bar to an item, then press **Enter** key to select the desired function.

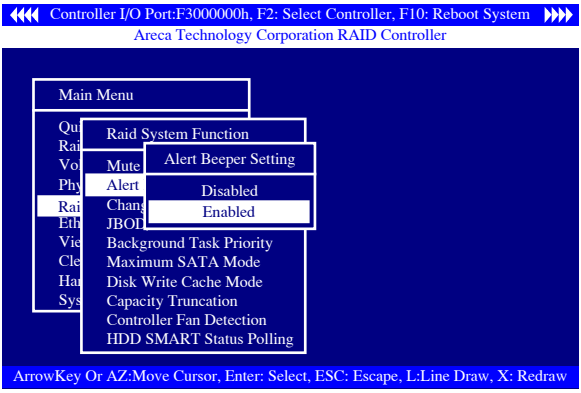


3.7.5.1 Mute The Alert Beeper



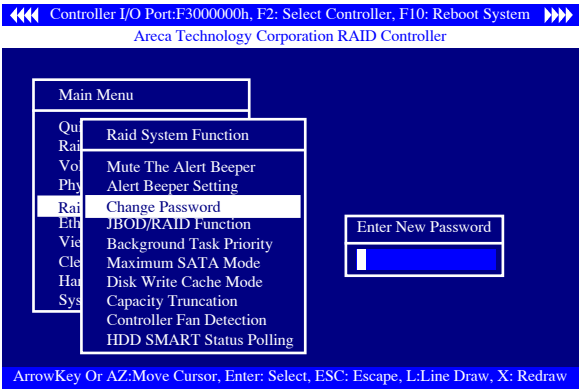
The Mute The Alert Beeper function item is used to control the SATA RAID controller Beeper. Select the **No** and press **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.

3.7.5.2 Alert Beeper Setting



The Alert Beeper function item is used to Disabled or Enable the SATA RAID controller alarm tone generator. Select the Disabled and press **Enter** key in the dialog box to turn the beeper off.

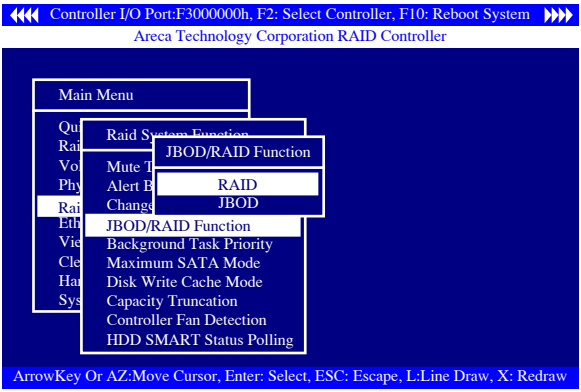
3.7.5.3 Change Password


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Raid System Function
Mute The Alert Beeper
Alert Beeper Setting
Change Password
JBOD/RAID Function
Background Task Priority
Maximum SATA Mode
Disk Write Cache Mode
Capacity Truncation
Controller Fan Detection
HDD SMART Status Polling
Enter New Password
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

The password option allows user to set or clear the password protection feature. Once the password has been set, the user can only monitor and configure the controller by providing the correct password. This feature is used to protect the internal

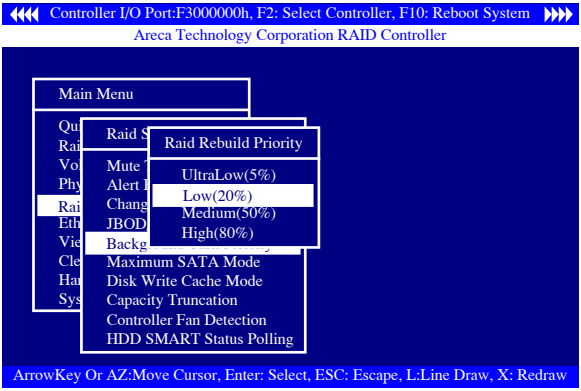
RAID system from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The system will automatically go back to the initial screen when it does not received any command in 20 seconds. To set or change the password, move the cursor to Raid System Function screen, press the Change Password item. The Enter New Password screen appears.
To disable the password, press **Enter** only in both the Enter New Password and Re-Enter New Password column. The existing password will be cleared. No password checking will occur when entering the main menu from the starting screen.

3.7.5.4 JBOD/RAID Function



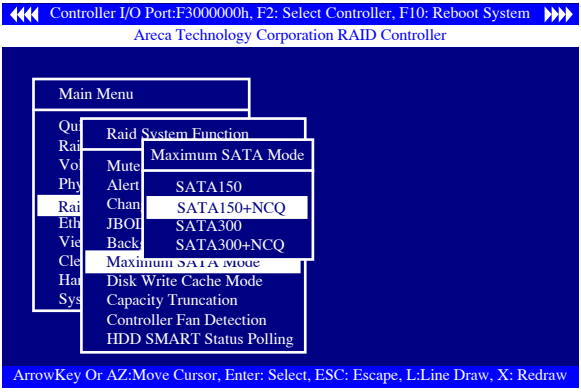
JBOD is an acronym for "**just a Bunch Of Disk**". It represents a volume set that is created by the concatenation of partitions on the disk. It can see all disks, when you selected the JBOD option. User needs to deleted the RAID set, when you want to change the option from the **RAID** to the **JBOD** function.

3.7.5.5 Background Task Priority



The "**Background Task Priority**" is a relative indication of how much time the controller devotes to a rebuild operation. The SATA RAID controller allows user to choose the rebuild priority (ultralow, low, normal, high) to balance volume set access and rebuild tasks appropriately.

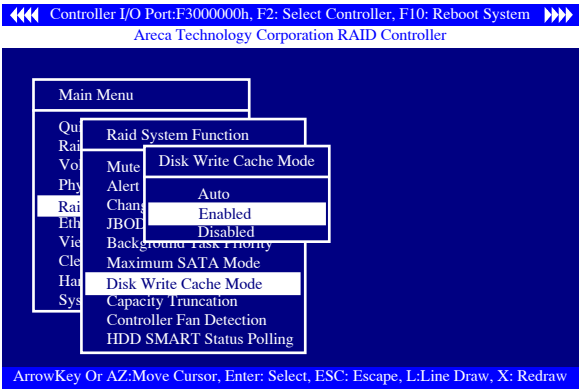
3.7.5.6 Maximum SATA Mode



The Controller can support up to SATA ll, which runs up to 300MB/s. NCQ is a command protocol in Serial ATA that can only be implemented on native Serial ATA hard drives. It allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms

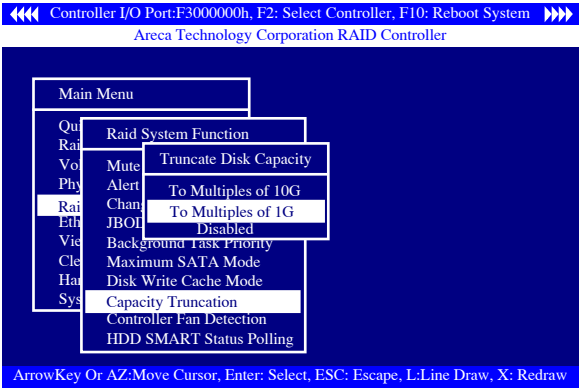
for outstanding and completed portions of the workload. The RAID Controller allows user to choose the SATA Mode: SATA150, SAT150+NCQ, SAT300, SATA300+NCQ.

3.7.5.7 Disk Write Cache Mode



User can set the "Disk Write Cache Mode" to: Auto, Enabled or Disabled.

3.7.5.8 Capacity Truncation


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Raid System Function
Truncate Disk Capacity
To Multiples of 10G
To Multiples of 1G
Disabled
Maximum SATA Mode
Disk Write Cache Mode
Capacity Truncation
Controller Fan Detection
HDD SMART Status Polling
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

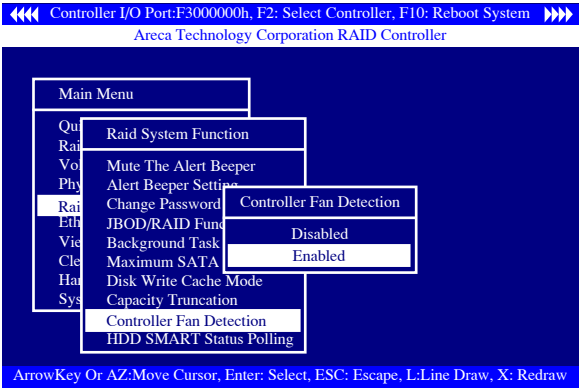
ARECA RAID controllers use drive truncation so that drives from differing vendors are more likely to be able to be used as spares for each other. Drive truncation slightly decreases the usable capacity of a drive that is used in redundant units.
The controller provides three truncation modes in the system configuration: **Multiples Of 10G**, **Multiples Of 1G**, and **No Truncation**.

Multiples Of 10G: If you have 120 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 120 GB. Areca drive Truncation mode **Multiples Of 10G** uses the same capacity for both of these drives so that one could replace the other.

Multiples Of 1G: If you have 123 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 123.4 GB. Areca drive Truncation mode **Multiples Of 1G** uses the same capacity for both of these drives so that one could replace the other.

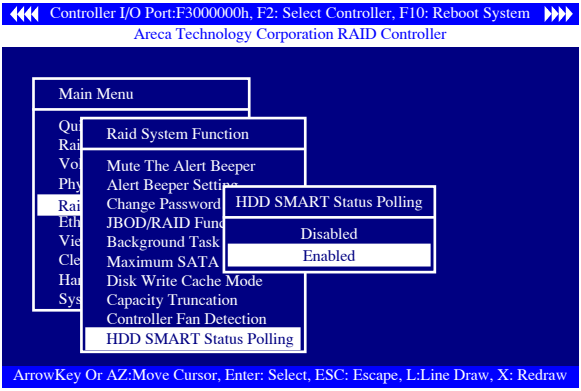
No Truncation: It does not truncate the capacity.Within the subsystem, the SCSI chip acts as a target and 5 SATA ll bus are connected to the drive.

3.7.5.9 Controller Fan Detection



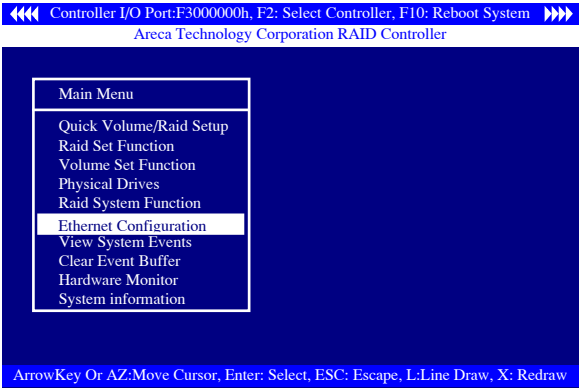
We have added, in the product box, a field replaceable passive heatsink to be used if there is enough airflow to carry out the heat in the passive heat sink.
The "Controller Fan Detection" function is available in the version 1.36 date: 2005-05-19 for preventing the Buzzer warning. Please disable the "Controller Fan Detection" function through the BIOS setting.
You can follow the following procedure to disable the Polling function. **(This function is not available in the Web Browser setting.)**

3.7.5.10 HDD SMART Status Polling



The external RAID has the hardware monitor in the dedicated backplane. It can report the HDD temperature status to the controller. But PCI card uses the general enclosure. The general enclosure can not report the HDD temperature to the controller. That is the reason why we add this function for customer to enable the repeat to scan the HDD temperature function in the version 1.36 date: 2005-05-19.You need to enable the "HDD SMART Status Polling" function before the function can work. This function is default disabled.
You can follow the following procedure in the BIOS setting to enable the Polling function. **(This function is not available in the Web Browser setting.)**

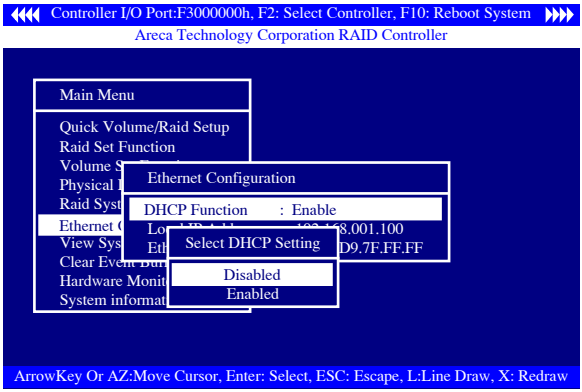
3.7.6 Ethernet Configuration (12/16/24 ports)



Use this feature to set the controller Ethernet port configuration. Customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service working.

3.7.6.1 DHCP Function

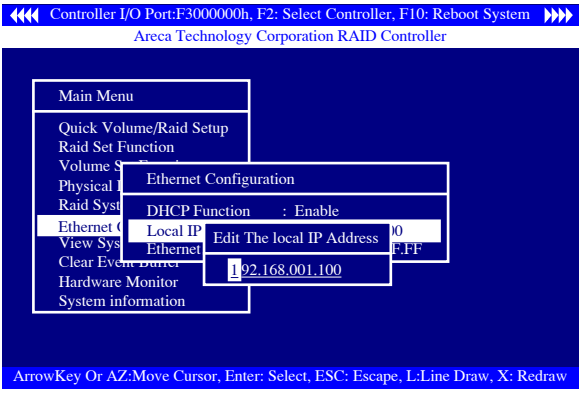
DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the Internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to eliminate the work necessary to administer a large IP network. To manually configure the IP address of the controller, move the cursor bar to the Main menu Ethernet Configuration Function item and then press the **Enter** key. The Ethernet Configuration menu appears on the screen. Move the cursor bar to DHCP Function item, then press **Enter** key to show the DHCP setting. Select the "Disabled' or 'Enabled" option to enable or disable the DHCP function.



3.7.6.2 Local IP address

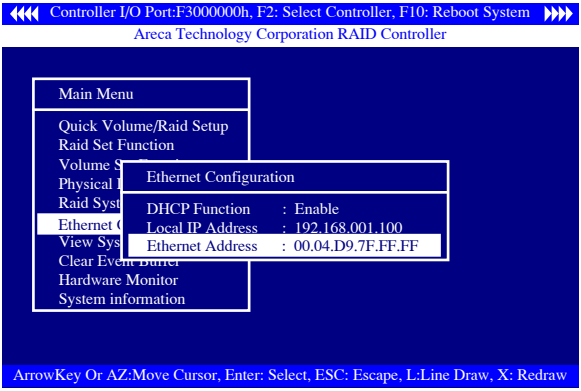
If you intend to set up your client computers manually, make

sure that the assigned IP address is in the same range of your default router address and that it is unique to your private network. However we would highly recommend that if you have a network of computers and the option to assign your TCP/IP client configurations automatically, please do. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors. To manually configure the IP address of the controller, move the cursor bar to the Main menu Ethernet Configuration Function item and then press the Enter key. The Ethernet Configuration menu appears on the screen. Move the cursor bar to Local IP Address item, then press Enter key to show the default address setting in the RAID controller. You can reassign the IP address of the controller.



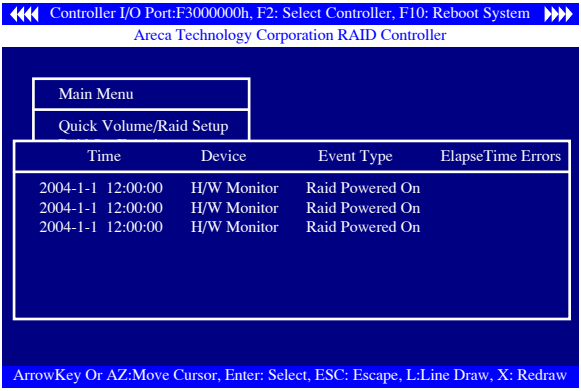
3.7.6.3 Ethernet Address

A MAC address stands for Media Access Control address and is your computer's unique hardware number. On an Ethernet LAN, it's the same as your Ethernet address. When you're connected to the Internet from the RAID controller Ethernet port, a correspondence table relates your IP address to the RAID controller's physical (MAC) address on the LAN.



3.7.7 View System Events

To view the SATA RAID controller's information, move the cursor bar to the main menu and select the View Events link, then press the **Enter** key The SATA RAID controller's events screen appear.

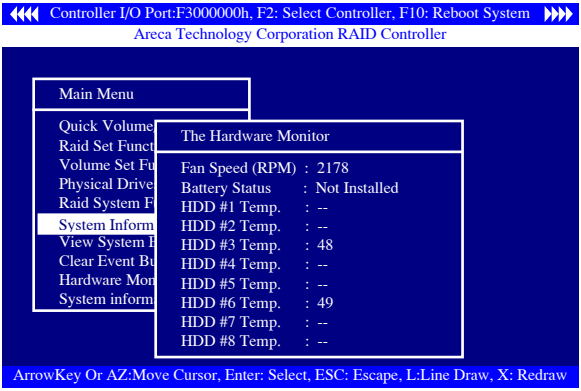

Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Quick Volume/Raid Setup
Time Device Event Type ElapseTime Errors
2004-1-1 12:00:00 H/W Monitor Raid Powered On
2004-1-1 12:00:00 H/W Monitor Raid Powered On
2004-1-1 12:00:00 H/W Monitor Raid Powered On
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

Choose this option to view the system events information: Timer, Device, Event type, Elapse Time and Errors. The RAID system does not built the real time clock. The Time information is the relative time from the SATA RAID controller power on.

3.7.8 Clear Events Buffer

Use this feature to clear the entire events buffer information.

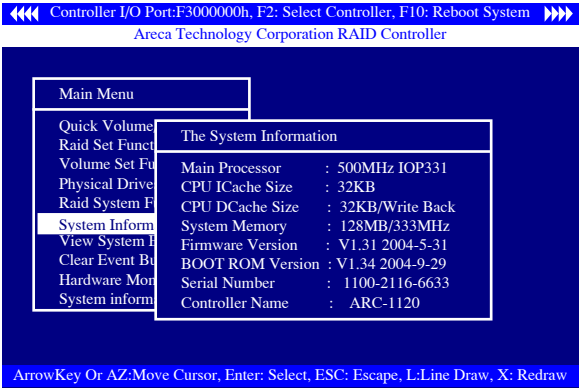
3.7.9 Hardware Monitor


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Quick Volume
Raid Set Funct
Volume Set Fu
Physical Drive
Raid System F
System Inform
View System I
Clear Event Bu
Hardware Mon
System inform
The Hardware Monitor
Fan Speed (RPM) : 2178
Battery Status : Not Installed
HDD #1 Temp. : --
HDD #2 Temp. : --
HDD #3 Temp. : 48
HDD #4 Temp. : --
HDD #5 Temp. : --
HDD #6 Temp. : 49
HDD #7 Temp. : --
HDD #8 Temp. : --
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

To view the RAID controller's hardware monitor information, move the mouse cursor to the main menu and click the Hardware Monitor link. The Hardware Information screen appears.

The Hardware Monitor Information provides the temperature, and fan speed (I/O Processor fan) of the PCI SATA RAID controller.

3.7.10 System Information


Controller I/O Port:F3000000h, F2: Select Controller, F10: Reboot System
Areca Technology Corporation RAID Controller
Main Menu
Quick Volume
Raid Set Funct
Volume Set Fu
Physical Drive
Raid System F
System Inform
View System I
Clear Event Bu
Hardware Mon
System inform
The System Information
Main Processor : 500MHz IOP331
CPU ICache Size : 32KB
CPU DCache Size : 32KB/Write Back
System Memory : 128MB/333MHz
Firmware Version : V1.31 2004-5-31
BOOT ROM Version : V1.34 2004-9-29
Serial Number : 1100-2116-6633
Controller Name : ARC-1120
ArrowKey Or AZ:Move Cursor, Enter: Select, ESC: Escape, L:Line Draw, X: Redraw

Choose this option to display Main processor, CPU Instruction cache and data cache size, firmware version, serial number, controller model name, and the cache memory size. To check the system information, move the cursor bar to System Information item, then press **Enter** key. All major controller system information will be displayed.

4. Driver Installation

This chapter describes how to install the SATA RAID controller drive to your operating system. The installation procedures depend on the following terminology:

Installing operating system on the SATA Volume

If you have a new drive configuration without an operating system and want to install operating system on a disk drive managed by the SATA RAID Controller. The driver installation is a part of the operating system installation.

Installing SATA RAID controller into an existing operating system

The computer has an existing operating system installed and the SATA RAID controller is being installed as a secondary controller.

Have all required system hardware and software component on hand before proceeding with the setup and installation
Materials required:

- Microsoft Windows 2000/XP/2003, or Linux, and or FreeBSD installation CD-ROM
- SATA RAID Controller Diver CD-ROM
- SATA RAID controller

4.1 Creating the Driver Diskettes

The SATA RAID controller shipped with CD-ROM disc is a self-booting CD. In order to created driver diskettes for Windows, Linux, and FreeBSD installation drivers. Your system required to supports bootable from CD-ROM.

If you do not have the CD-ROM disc with the package, contact your local dealer or you can also download the latest version drivers for Windows 2000/XP/2003, Linux, and freeBSD from the ARECA web site at http://www.areca.com.tw .

The following steps is creating the Driver diskettes:

1. The computer system BIOS must set to boot-up from CD-ROM.

2. Insert the SATA Controller Driver CD disc into the CD-ROM drive.

3. System will boot-up from CD-ROM Drive, to create the driver diskettes selected the "**SATA RAID controller Driver Diskette Make Utility**", and provides several screens with choices.

4. Move the highlight bar to the "**Create Driver Disk**" entry and press **Enter**.

5. The screen queries the SATA RAID controller support driver database and a list of supported driver is displayed. Move the highlight bar to the driver entry and press **Enter** for moving forward.

6. The next screen will show "**Please insert a formatted diskette into drive A:!! Press any key to continue**". Insert the formatted diskette in drive "**A**" and press any key to continue.

7. The window will displays the driver building message: "**Now is writing to Cylinder...**" and copy the image file from the CD-ROM to Driver Diskette.

8. The "**Write Complete !!**" message will show at the screen when the driver is build ready.

The driver diskette is now made. Proceed to the following instruction for installation procedures.

4.2 Driver Installation for Windows

SATA RAID controller can be used with Microsoft Windows 2000, Windows XP, and Windows Server 2003. Windows 2003 64-bit for AMD Opteron is also supported. SATA RAID controllers supports SCSI Miniport and StorPort Drivers for Windows Server 2003.

4.2.1 New Storage Device Drivers in Windows Server 2003

The Storport driver is new to Windows Server 2003. Storport implements a new architecture designed for better performance for

RAID systems and in Storage Area Network (SAN) environments. Storport delivers higher I/O throughput, enhanced manageability, and an improved miniport interface. Storport better utilizes faster adapters through the use of reduced Delay Procedure Call (DPC) and improved queue management.

4.2.2 Install Windows 2000/XP/2003 on a SATA RAID Volume

The following instructions explain how to install the SATA RAID controller Driver. For completed details on installing Windows, see the Windows User's Manual.

4.2.2.1 Installation procedures

The following is the procedures for installing the SATA RAID controller driver while installing Windows 2000/XP/2003.
Boot-up Microsoft Windows 2000/XP/2003 from CD-ROM and follow the required procedure below to install SATA RAID controller:

1. Make sure you follow the instructions in Chapter 2 "**Hardware Installation**" to install the controller and connect the disk drives or enclosure.

2. Start the system and then press Tab/F6 to enable the McBIOS RAID manager. Use the McBIOS manager to create the RAID set and volume set to which you will install Windows system. For details, see Chapter 3 "**McBIOS RAID manager**". Once a volume set is created and configured, continue with next step to install the operating system.

3. Insert Windows setup CD and restart the system to begin the Windows installation.

Note:

The computer system BIOS must support bootable from CD-ROM.

4. Press F6 when the screen shows "**Setup is inspecting your Computer's hardware Configuration**". This must be done or else the new driver installed from the SATA RAID driver diskette will not be recognized.

5. The next screen will show: "**Setup could not determine the type of one or more mass storage device installed in your system.**" Selected specify additional SCSI adapter by pressing S.

6. Window will prompt for the "**Manufacturer-supplied hardware support disk**" into floppy drive A: Insert the SATA RAID series driver diskette in drive "A:" and press **Enter**.

7. Window will check the floppy and select the correct drive and CPU type in the listing that you want to install and press **Enter** to install it.

8. After Windows scans the hardware and finds the controller, it will display:
"**Setup will load support for the following Mass Storage devices:**"
"**Windows 2K, XP,2K3 (ARC1XX0) SATA PCI-X (or PCI-Express) RAID Controller**". Press **Enter** to continue and copy the driver files.
At this point, simply follow the Microsoft Windows installation procedure.
Follow the on-screen instructions, responding as needed to complete the installation.

9. After the installation is completed, reboot the system to load the new drivers.

10. See Chapter 5 in this manual to customize your RAID volume sets using Storage manager.

4.2.2.2 Making Volume Sets Available to Windows System

When you reboot the system, log in as system administrator. Continue with the following steps to make any new volume sets

or pass-through disks accessible to Windows. This procedure assumes that the SATA RAID controller hardware, driver, and Windows are installed and operational in your system.

1. Partition and format the new volume set or disks using Disk Administrator:

a. Choose Administrative Tools from the Start menu.
b. Choose Computer Management from the Administrative Tools menu.
c. Select Storage.
d. Select Disk Management.

2. Follow the on-screen prompts to write a signature to the drive.

3. Right click on the disk drive and select Create Volume from the menu.

4. Follow the on-screen prompts to create a volume set and to give a disk drive letter.

4.2.3 Install controller into an existing Windows 2000/XP/2003

In this scenario, you are installing the controller in a new Windows system. To install the driver:

1. Follow the instructions in Chapter 2 **Hardware Installation** Chapter to install the controller and connect the disk drives or enclosure.

2. Start the system and then press Tab/F6 to enter the McBIOS-based configuration utility. Use the configuration utility to create the raid set and volume set. For details, see Chapter 3 **McBIOS RAID Manager**. Once a volume set is created and configured, continue with install the driver.

3. Re-Boot Windows and OS will recognizes the SATA RAID Controller and launches the "**Found New Hardware Wizard**", which guides you in installing the SATA RAID driver.

4. The "**Upgrade Device Driver Wizard**" popup and provides a choice for the wizard to select. Choose "**Display a list of known drivers for this device, so that you can choose a specific driver.**" and click on **Next**.

5. When the next screen queries the user about utilizing the currently installed driver, click on **Have Disk** button.

6. When the "**Install From Disk**" dialog appears, insert the SATA RAID controller driver diskette or the ship CD-ROM and type the correct path name in the "**Copy manufacturer's files from:**"

7. The previous dialog box appears with the selected driver displayed as of the driver to install. Then click on **Next**.

8. The "**Digital Signature Not Found**" screen appears. Click on **Yes** to continue the installation.

9. Windows automatically copies the appropriate driver files and rebuilds its driver database.

10. The "**Found New Hardware Wizard**" summary screen appears Click on the **Finish** button.

11. The "**System Settings Change**" dialog box appears. Remove the diskette from the drive and click on **Yes** to restart the computer to load the new drivers.

12. See Chapter 5 in this manual to customize your RAID volumes using Storage manager.

4.2.3.1 Making Volume Sets Available to Windows System

When you reboot the system, log in as system administrator. Continue with the following steps to make any new disk arrays or independent disks accessible to Windows 2000/XP/2003. This procedure assumes that the SATA RAID controller hardware, driver, and Windows are installed and operational in your system.

1. Partition and format the new arrays or disks using Disk Administrator:

a. Choose Administrative Tools from the Start menu.
b. Choose Computer Management from the Administrative Tools menu.
c. Select Storage.
d. Select Disk Management.

2. Follow the on-screen prompts to write a signature to the drive.

3. Right click on the drive and select Create Volume from the menu.

4. Follow the on-screen prompts to create a volume set and to give a disk drive letter.

4.2.4 Uninstall controller from Windows 2000/ XP/2003

To remove the SATA RAID controller driver from the Windows system follow the instructions below.

1. Ensure that you have closed all applications and are logged in with administrative rights.

2. Open **Control Panel** and start the **Add/Remove Program** icon.

3. Select the SATA RAID controller driver and click on **OK**.

4. Click on **Yes** to confirm removing the SATA RAID driver. The Uninstall shield program will start removing files and display a progress bar. After the programs have been completely removed from your system, the uninstall shield program will show a summary of files removed and updates completed while removing files from the system. It will also recommend that the user restart the system.

4.3 Driver Installation for Linux

This chapter describes how to install the SATA RAID controller drive to your Red Hat Linux, and SuSE Linux.
Before installing the SATA RAID driver to the Linux, you must have done the following action:

1. Install and configure the controller and hard disk drives according to the instructions in Chapter 2 **Hardware Installation**.

2. Start the system and then press Tab/F6 to enter the McBIOS RAID manager configuration utility. Use the BIOS configuration utility to create the raid set and volume set. For details, see Chapter 3 **McBIOS RAID Manager**.
If you are using a Linux distribution for which there is not a compiled driver available from ARECA, you can copy the source from the SATA software CD or download the source from the ARECA website and compile a new driver.
Compiled and tested drivers for Red Hat and SuSE Linux are included on the ship CD. You can download the updated version compiled and tested driver for Red Hat or SuSE Linux from the ARECA web site at http://www.areca.com.tw. Included in these downloads is the Linux driver source, which you can use to compile the updated version driver for RedHat, SuSE, and other versions of Linux.
Please refer to the "**readme.txt**" file on the ARECA ship CD-ROM or website to make driver diskette and to install driver to the system.

4.4 Driver Installation for FreeBSD

This chapter describes how to install the SATA RAID controller drive to your FreeBSD.
Before installing the SATA RAID driver to the FreeBSD, you must do the following action:

1. Install and configure the controller and hard disk drives according to the instructions in Chapter 2 **Hardware Installation**

2. Start the system and then press Tab/F6 to enter the **McBIOS RAID Manager** configuration utility. Use the BIOS configuration utility to create the raid set and volume set. For details, see Chap-

ter 3 **McBIOS RAID Manager**.
The ship CD-ROM that came with the SATA RAID controller includes compiled and tested drivers for FreeBSD 4.x (4.2 and onwards) and 5.x (5.2 and onwards). To check if a more updated version driver is available, please see the ARECA web site http://www.areca.com.tw.

Please refer to the "**readme.txt**" file on the SATA RAID controller software CD-ROM or website to make driver diskette and to install driver to the system.

5. Installation ArcHttp Proxy Server

Overview

After the hardware installation, the SATA disk drives connected to the SATA RAID controller must be configured and the volume set units initialized before they are ready to use.
Those user interfaces can access the built-in configuration and administration utility that resides in the controller's firmware. They provide complete control and management of the controller and disk arrays, eliminating the need for additional hardware or software.
The software utility refers to SATA RAID controller software on the CD-ROM delivered with your system. This CD-ROM contains the software utility that is required for the monitor, test, and support of SATA RAID controller. The software utility and McRAID storage manager can configure and monitor the SATA RAID controller via ArcHttp Proxy Server. The following table outlines their functions:

Configuration Utility	Operating System supported
McBIOS RAID Manager	OS-Independent
McRAID Storage Manager (Via Archttp proxy server)	Windows 2000/XP/2003, Linux and FreeBSD
SAP Monitor (Single Admin portal to scan for multiple RAID units in the network, Via ArcHttp Proxy Server)	Windows 2000/XP/2003 Java based for Windows. Linux and FreeBSD (available in Q2, 2005)
SNMP Manager Console Integration (Via ArcHttp Proxy Server)	Windows 2000/XP/2003, Linux. FreeBSD (available in Q2, 2005)

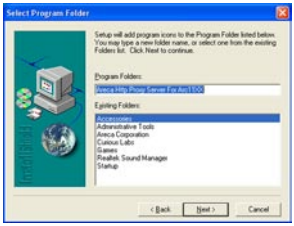
5.1 For Windows

You must have administrative level permission to install SATA RAID software. This procedure assumes that the SATA RAID hardware and windows are installed and operational in your system.
Screen in this section are taken from a Windows/XP installation. If you are running other Windows, your installing screen may look different, but the ArcHttp proxy server installation is essentially the same.

1. Insert the RAID subsystem CD in the CD-ROM drive.
2. Run the setup.exe file that resides at: <CD-ROM>\windows\http\setup.exe on the CD-ROM.

3. Click on the Setup file then the Welcome screen appears.

Follow the on-screen prompts to complete ArcHttp Proxy Server software installation.
A program bar appears that measures the progress of the ArcHttp setup. When this screen complete, you have completed the ArcHttp Proxy Server software setup.
4. After a successful installation, the Setup Complete dialog box of the installation program is displayed.
Click the **Finish** button to complete the installation.



5. See next chapter in the McRAID storage manager to customize your RAID volume set.

5.2 For Linux

You must have administrative level permission to install SATA RAID software. This procedure assumes that the SATA RAID hardware and Linux are installed and operational in your system.
The following is the Linux installation procedure in the SATA RAID controller system.

1. Insert the SATA RAID controller CD in the CD-ROM drive.

2. Run the ArcHttpPci file that resides at: <CD-ROM>\linux\http\ on the CD-ROM.

Usage: ArcHttpPci TCP_PORT

Parameters: TCP_PORT value = 1 ~ 65535
For Example:
Start the ArcHttp Proxy Server for TCP_PORT = 6666, user can type "ArcHttpPci 6666" on command line and enter to execute it.

3. See next chapter in the McRAID storage manager to customize your RAID volume set.

Note:

For RedHat Users: upgrade Mozilla Browser to Version 1.6 or later.

6. Web Browser-based Configuration

Before using the McRAID firmware-based browser utility, do the initial setup and installation of this product. If you need to boot up the operating system from a RAID volume set, you must first create a RAID volume by using **McBIOS RAID Manager**. Please refer to section 3.3 **Using Quick Volume /Raid Setup Configuration** for information on creating this initial volume set.

The McRAID manager is firmware-based utility, which utilizes the browser installed on your operating system. The McRAID Manager program is an HTML-based application, which utilizes the browser (IE, Netscape and Mozilla etc) installed on your monitor station. It allows user through web browser to create and modify RAID set, volume set, and monitor SATA RAID Controller status. Use this utility to:

- Create raid set
- Expand raid set
- Define volume set
- Add physical drive
- Modify volume set
- Modify RAID level/stripe size
- Define pass-through disk drives
- Modify system function
- Update firmware
- Designate drives as hot spares

6.1 Start-up McRAID Manager for Local Administration

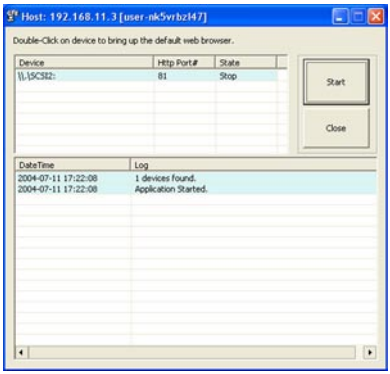
With McRAID Storage Manager, you can Local manage a system containing a SATA RAID controller that has Windows or Linux and a supported browser.
A locally managed system requires all of the following components:

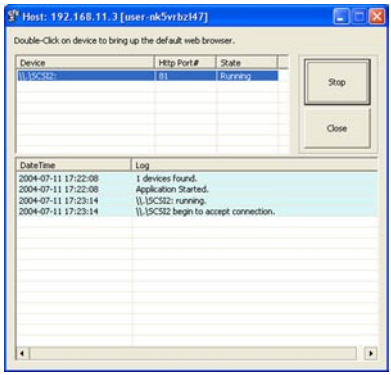
- A supported Web browser, which should already be installed on the system.
- Installing an ArcHttp proxy server on the SATA RAID system.

6.1.1 For Windows

Screen in this section are taken from a Windows/XP installation. If you are running other Windows, your installing screen may look different, but the ArcHttp proxy server installation is essentially the same.

1. Click on the **Start** Button in the Windows 2000/XP task bar and then click **Program**, select the **ArcHttp Proxy Server** and run "**ArcHttp Proxy Server**". The ArcHttp dialog box appears. If user doesn't want to launch the web browser, goes to step 4.



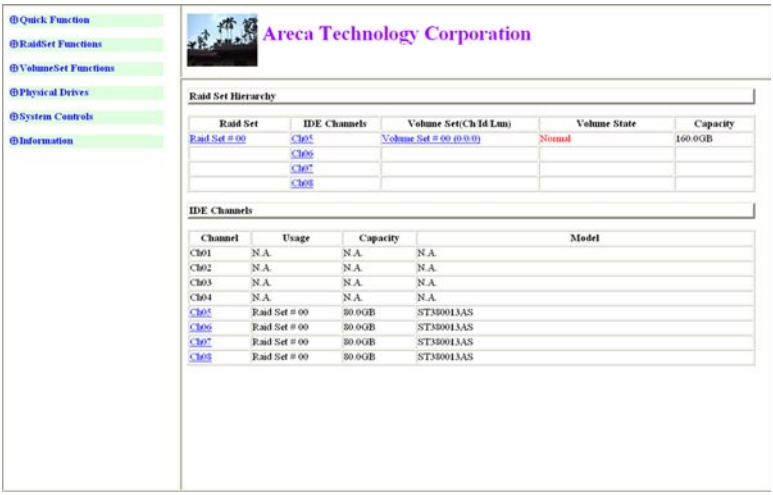


2. To start the ArcHttp Proxy Server web-browser management, click the **Start** Button.

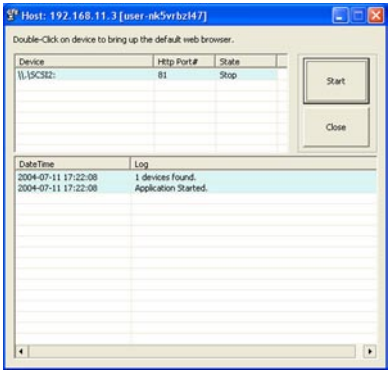
Enter Network Password
This secure Web Site (at 192.168.11.3) requires you to log on.
Please type the User Name and Password that you use for Raid Console.
User Name
admin
Password
Save this password in your password list
OK
Cancel

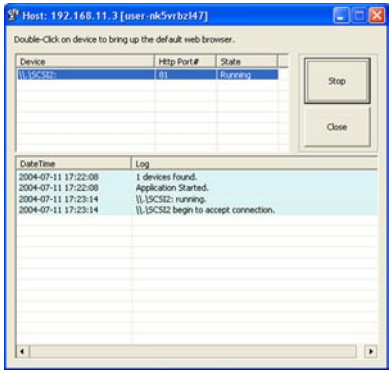
The Enter Network Password dialog screen appears, type the User Name and Password. The RAID subsystem controller default User Name is "**admin**" and the Password is "**0000**". After completing entering user name and password, press Enter to start-up the ArcHttp Proxy Server.

3. The Storage Console current configuration screen displays the current configuration of your RAID subsystem.



4. If you don't default start-up the web browser, clear "**The Launch Web Browser when server started!!**" setting. To start the ArcHttp Proxy Server web-browser management, click the **Start** button.





9. User may execute the ArcHttp proxy server by entering http://[IP Address] in your web browser.

6.1.2 For Linux

Execute the ArcHttp proxy server by entering http://[IP Address] in the Netscape browser provided with Linux. Note that Linux prompts you to login to the machine with an ID of root. The SATA RAID controller default User Name (ID) is "**admin**" and the Password is "**0000**"

6.2 Start-up McRAID Manager for Remote Administration

You can manage a system remotely from a system that does not contain a SATA RAID controller.
A remotely managed system requires all of the following components:

- The remote system must contain a web browser.
- The managed system must contain a McRAID storage manager.
- Installing an ArcHttp proxy server on the managed system.
- Remote and managed systems must have a TCP/IP connection.

6.2.1 Microsoft Windows System

To configure internal SATA RAID controller on a remote machine, you need to know its IP Address. You must first start up your local ArcHttp Proxy Server. (Please reference this chapter section 6.1.1).

(1).Launch your ArcHttp Proxy Server by entering http://[IP Address] in the remote web browser.

(2). When connection to the remote system is established, the System Login screen appears. The SATA RAID controller default User Name is "**admin**" and the Password is "**0000**"

Note:

That you must be logged in as administrator with local admin rights on the remote machine to remotely configure it.

6.2.2 Linux System

To configure SATA RAID controller on a remote machine, you need to know its IP Address. You must first start up your local ArcHttp proxy server. (Please reference this chapter section 6.1.1).

(1).Launch your ArcHttp proxy server by entering http://[IP Address] in the remote web browser.

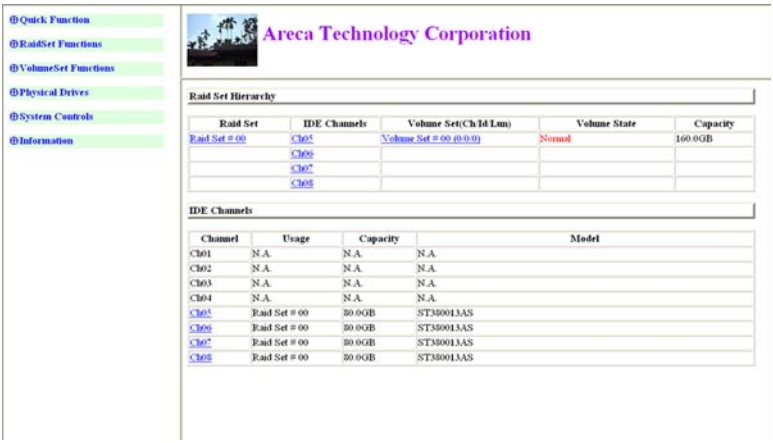
(2). When connection to the remote system is established, the System Login screen appears. The SATA RAID controller default User Name is "**admin**" and the Password is "**0000**"

Note:

That you must be logged in as administrator with local admin rights on the remote machine to remotely configure it.

6.3 SATA RAID controller McRAID storage manager

The McRAID storage manager current configuration screen displays the current configuration of your SATA RAID controller. It displays the Raid Set List, Volume Set List and Physical Disk List. The raid set information, volume set information and drive information can also be viewed by clicking on the RaidSet Hierarchy screen. The current configuration can also be viewed by clicking on RaidSet Hierarchy in the menu.



To display raid set information, move the mouse cursor to the desired raid set number, then click it. The raid set Information will show in the screen.
To display volume set information, move the mouse cursor to the desired Volume Set number, then click it. The volume set Information will show in the screen.
To display drive information, move the mouse cursor to the desired physical drive number, then click it. The drive Information will show in the screen.

6.4 Main Menu

The Main Menu shows all function that enables the customer to execute actions by clicking on the appropriate link.

Individual Category	Description
Quick Function	Create a default configuration, which is based on the number of physical disk installed; it can modify the volume set Capacity, Raid Level, and Stripe Size.
RaidSet Functions	Create a customized raid set
VolumeSet Functions	Create customized volume sets and modify the existed volume sets parameter.

Physical Drives	Create pass through disks and modify the existed pass through drives parameter. It also provides the function to identify the respect disk drive.
System Controls	Setting the raid system configurations
Information	View the controller information. The Raid Set Hierarchy can also view through the RaidSet Hierarchy item.

6.5 Quick Function

The number of physical drives in the SATA Raid controller determines the RAID levels that can be implemented with the raid set. You can create a raid set associated with exactly one volume set. The user can change the raid level, stripe size, and capacity. A hot spare option is also created depending upon the existing configuration.

Tick on the Confirm The Operation and click on the Submit button in the Quick Create screen, the raid set and volume set will start to initialize.

Note: In Quick Create your volume set is automatically configured based on the number of disks in your system. Use the Raid Set Function and Volume Set Function if you prefer to customize your system.

6.6 RaidSet Functions

Use the Raid Set Function and Volume Set Function if you prefer to customize your system. User manual configuration can full control of the raid set setting, but it will take longer to complete than the Quick Volume/Raid Setup configuration. Select the Raid Set Function to manually configure the raid set for the first time or deletes existing raid set and reconfigures the raid set. A raid set is a group of disks containing one or more volume sets.

6.6.1 Create Raid Set

To create a raid set, click on the Delete Raid Set link. A "Select The IDE Drive For RAID Set" screen is displayed showing the IDE drive connected to the current controller. Click on the selected physical drives with the current raid set. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.
Tick on the Confirm The Operation and click on the Submit button in the screen, the raid set will start to initialize.

6.6.2 Delete Raid Set

To delete a raid set, click on the Create Raid Set link. A "**Select The RAID SET To Delete**" screen is displayed showing all raid set existing in the current controller. Click the raid set number

you which to delete in the select column to delete screen.
Tick on the Confirm The Operation and click on the Submit button in the screen to delete it.

6.6.3 Expand Raid Set

Use this option to expand a raid set, when a disk is added to your system. This function is active when at least one drive is available.

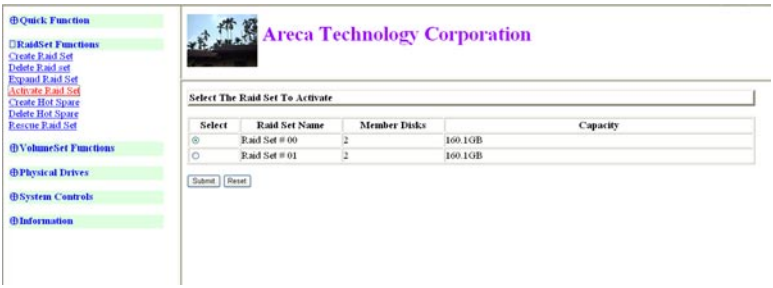
To expand a raid set, click on the Expand Raid Set link. Select the target raid set, which you want to expand it.
Tick on the available disk and Confirm The Operation, and then click on the Submit button in the screen to add disks to the raid set.

6.6.4 Activate Incomplete Raid Set

When one of the disk drive is removed in power off state, the raid set state will change to Incomplete State. If user wants to contin-

ue to work, when the SATA RAID controller is power on. User can use the Activate Raid Set option to active the raid set. After user complete the function, the Raid State will change to Degraded Mode.

To activate the incomplete the raid set, click on the Activate Raid Set link. A "Select The RAID SET To Activate" screen is displayed showing all raid set existing in the current controller. Click the raid set number you which to activate in the select column.



Click on the Submit button in the screen to activate the raid set that has removed one of disk drive in the power off state. The SATA RAID controller will continue to work in degraded mode.

6.6.5 Create Hot Spare

When you choose the Create Hot Spare option in the Raid Set Function, all unused physical devices connected to the current controller appear:

Select the target disk by clicking on the appropriate check box. Tick on the Confirm The Operation, and click on the Submit button in the screen to create the hot spares.

The create Hot Spare option gives you the ability to define a global hot spare.

6.6.6 Delete Hot Spare

Select the target Hot Spare disk to delete by clicking on the appropriate check box.
Tick on the Confirm The Operation, and click on the **Submit** button in the screen to delete the hot spares.

6.6.7 Rescue Raid Set

When the system is power off in the Raidset update period, it may be disappeared in this abnormal condition. The "**RESCUE**" function can recover the missing RaidSet information.
The RAID controller uses the time as the RaidSet signature. The RaidSet may have different time after the RaidSet is recovered. The "**SIGANT**" function can regenerate the signature for the RaidSet.

6.7 Volume Set Functions

A volume set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a volume set. A volume set capacity can consume all or a portion of the disk capacity available in a raid set. Multiple volume sets can exist on a group of disks in a raid set. Additional volume sets created in a specified raid set will reside on all the physical disks in the raid set. Thus each volume set on the raid set will have its data spread evenly across all the disks in the raid set.

6.7.1 Create Volume Set

1. Volume sets of different RAID levels may coexist on the same raid set.
2. Up to 16 volume sets in a raid set can be created by the SATA RAID controller.
3. The maximum addressable size of a single volume set is 2 TB(32-bit mode).

To create volume set from raid set system, move the cursor bar to the main menu and click on the Create Volume Set link. The Select The Raid Set To Create On It screen will show all raid set number. Tick on a raid set number that you want to create and then click on the Submit button.

The new create volume set allows user to select the Volume name, capacity, RAID level, strip size, SCSI ID/LUN, Cache mode and tag queuing.

- **Volume Name**

The default volume name will always appear as Volume Set. #. You can rename the volume set name providing it does not exceed the 15 characters limit.

- **Capacity**

The maximum volume size is default in the first setting. Enter the appropriate volume size to fit your application.

- **Raid Level**

Set the RAID level for the Volume Set. Highlight Raid Level and press Enter.

The available RAID levels for the current Volume Set are displayed. Select a RAID level and press Enter to confirm.

- **Strip Size**

This parameter sets the size of the stripe written to each disk in a RAID 0, 1, (10), 5 or 6 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.
A larger stripe size produces better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a small stripe size
Note: RAID level 3 can't modify strip size.

- **Cache Mode**

The SATA RAID controller supports Write-Through Cache and Write-Back Cache.

- **SCSI Channel/SCSI ID/SCSI Lun**

SCSI Channel: The SATA RAID controller function is simulated to the SCSI RAID controller. The host bus is represented to the SCSI channel. Choose the SCSI Channel.
SCSI ID: Each SCSI device attached to the SCSI card, as well as the card itself, must be assigned a unique SCSI ID number. A SCSI channel can connect up to 15 devices. The SATA RAID controller is as a lots of large SCSI device. We should assign an ID from a list of SCSI IDs.
SCSI LUN: Each SCSI ID can support up to 8 LUNs. Most SCSI controller treats each LUN like a SCSI disk.

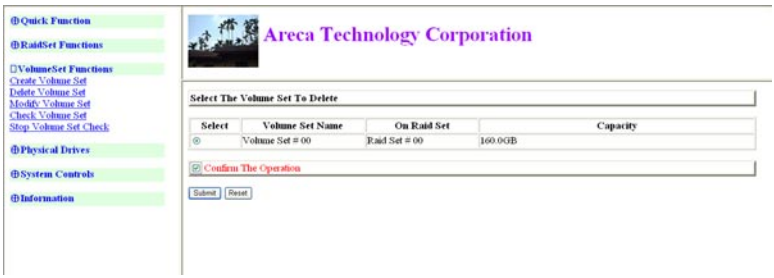
- **Tag Queuing**

The Enabled option is useful for enhancing overall system performance under multi-tasking operating systems. The Command Tag (Drive Channel) function controls the SCSI command tag queuing support for each drive channel. This function should normally remain enabled. Disable this function only when using older SCSI drives that do not support command tag queuing

6.7.2 Delete Volume Set

To delete Volume from raid set system function, move the cursor

bar to the main menu and click on the Delete Volume Set link. The Select The Raid Set To Delete screen will show all raid set number. Tick on a raid set number and the Confirm The Operation and then click on the Submit button to show all volume set item in the selected raid set. Tick on a volume set number and the Confirm The Operation and then click on the Submit button to delete the volume set.



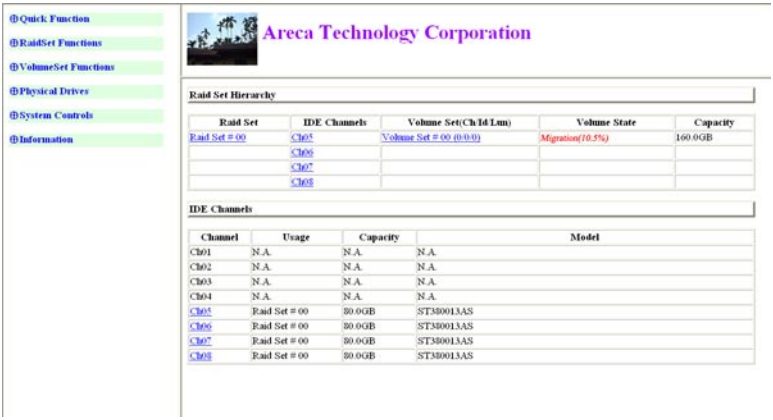
6.7.3 Modify Volume Set

To modify a volume set from a raid set:
(1). Click on the Modify Volume Set link.
(2). Tick on the volume set from the list that you wish to modify. Click on the **Submit** button.
The following screen appears.
Use this option to modify volume set configuration. To modify volume set attribute values from raid set system function, move the cursor bar to the volume set attribute menu and click on it. The modify value screen appears. Move the cursor bar to an attribute item, and then click on the attribute to modify the value. After you complete the modification, tick on the Confirm The Operation

and click on the Submit button to complete the action. User can modify all values except the capacity.

6.7.3.1 Volume Set Migration

Migrating occurs when a volume set is migrating from one RAID level to another, a volume set strip size changes, or when a disk is added to a raid set. Migration status is displayed in the volume status area of the RaidSet Hierarchy screen when one RAID level to another, a Volume set strip size changes or when a disk is added to a raid set.



6.7.4 Check Volume Set

To check a volume set from a raid set:
(1). Click on the Check Volume Set link.
(2). Tick on the volume set from the list that you wish to check. Tick on Confirm The Operation and click on the Submit button. Use this option to verify the correctness of the redundant data in a volume set. For example, in a system with dedicated parity, volume set check means computing the parity of the data disk drives and comparing the results to the contents of the dedicated parity disk drive. The checking percentage can also be viewed by clicking on RaidSet Hierarchy in the main menu.

6.7.5 Stop VolumeSet Check

Use this option to stop the Check Volume Set function.

6.8 Physical Drive

Choose this option from the Main Menu to select a physical disk and to perform the operations listed below.

6.8.1 Create Pass-Through Disk

To create pass-through disk, move the mouse cursor to the main menu and click on the Create Pass-Through link. The relative setting function screen appears.
Disk is no controlled by the SATA RAID controller firmware and thus cannot be a part of a volume set. The disk is available to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the RAID firmware. User can also select the cache mode, Tagged Command Queuing, SCSI channel/SCSI_ID/SCSI_LUN for this volume.

6.8.2 Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk Attribute. User can modify the cache mode, Tagged Command Queuing, and SCSI channel/ID/LUN on an existed pass through disk.
To modify the pass-through drive attribute from the pass-through drive pool, move the mouse cursor bar to click on Modify Pass-Through link. The Select The Pass Through Disk For Modification screen appears tick on the Pass-Through Disk from the pass-through drive pool and click on the Submit button to select drive. The Enter Pass-Through Disk Attribute screen appears, modify the drive attribute values, as you want.

After you complete the selection, tick on the Confirm The Operation and click on the Submit button to complete the selection action.

6.8.3 Delete Pass-Through Disk

To delete pass-through drive from the pass-through drive pool, move the mouse cursor bar to the main menus and click on Delete Pass Through link.

After you complete the selection, tick on the Confirm The Operation and click on the Submit button to complete the delete action.

6.8.4 Identify Selected Drive

To prevent removing the wrong drive, the selected disk LED will light for physically locating the selected disk when the Identify Selected Drive is selected.
To identify the selected drive from the drives pool, move the mouse cursor bar to click on Identify Selected Drive link. The Select The IDE Device For identification screen appears tick on the IDE device from the drives pool and Flash method. After completing the selection, click on the Submit button to identify selected drive.

6.9 System Controls

6.9.1 System Config

To set the raid system function, move the cursor bar to the main menu and click on he Raid System Function link. The Raid System Function menu will show all items. Move the cursor bar to an item, then press Enter key to select the desired function.

- **System Beeper Setting**
  The Alert Beeper function item is used to Disabled or Enable the SATA RAID controller alarm tone generator.

- **Background Task Priority**
  The Raid Rebuild Priority is a relative indication of how much time the controller devotes to a rebuild operation. The SATA RAID controller allows user to choose the rebuild priority (ultraLow, Low, Normal, High) to balance volume set access and rebuild tasks appropriately. For high array performance, specify a Low value.

- **JBOD/RAID Configuration**
  JBOD is an acronym for "**just a Bunch Of Disk**". It represents a volume set that is created by the concatenation of partitions on the disk. It can see all 8 disks, when you selected the JBOD option. User needs to deleted the RAID set, when you want to change the option from the RAID to the JBOD function.

- **Maximum SATA Mode Supported**
  The Controller can support up to SATA ll, which runs up to 300MB/s. NCQ is a command protocol in Serial ATA that can only be implemented on native Serial ATA hard drives. It allows multiple commands to be outstanding within a drive at the same time. Drives that support NCQ have an internal queue where outstanding commands can be dynamically rescheduled or re-ordered, along with the necessary tracking mechanisms for outstanding and completed portions of the workload. The RAID subsystem allows user to choose the SATA Mode: SATA150, SAT150+NCQ, SAT300, SATA300+NCQ.

- **Write Disk Cache Mode**

User can set the "Disk Write Cache Mode" to: Auto, Enabled or Disabled.

● **Disk Capacity Truncation Mode:**
ARECA RAID controllers use drive truncation so that drives from differing vendors are more likely to be able to be used as spares for each other. Drive truncation slightly decreases the usable capacity of a drive that is used in redundant units.
The controller provides three truncation modes in the system configuration: **Multiples Of 10G**, **Multiples Of 1G**, and **No Truncation**.

Multiples Of 10G: If you have 120 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 120 GB. Areca drive Truncation mode **Multiples Of 10G** uses the same capacity for both of these drives so that one could replace the other.

Multiples Of 1G: If you have 123 GB drives from different vendors; chances are that the capacity varies slightly. For example, one drive might be 123.5 GB, and the other 123.4 GB. Areca drive Truncation mode **Multiples Of 1G** uses the same capacity for both of these drives so that one could replace the other.

No Truncation: It does not truncate the capacity.

6.9.2 Ethernet Configuration (12/16/24 ports)

Use this feature to set the controller Ethernet port configuration. Customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service working. The firmware-embedded Web Browser-based RAID manager can access it from any standard internet browser or from any host computer either

directly connected or via a LAN or WAN with no software or patches required.
DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the Internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to eliminate the work necessary to administer a large IP network.

To configure the raid controller EtherNet port, move the cursor bar to the main menu and click on the System Controls link. The System Controls menu will show all items. Move the cursor bar to the EtherNet Config item, then press **Enter** key to select the desired function.

Areca Technology Corporation
Ether Net Configuration
DHCP Function
Local IP Address (Used If DHCP Disabled)
Gateway IP Address (Used If DHCP Disabled)
Subnet Mask (Used If DHCP Disabled)
HTTP Port Number (7168..8191 Is Reserved)
Telnet Port Number (7168..8191 Is Reserved)
Current IP Address
Current Gateway IP Address
Current Subnet Mask
Ether Net MAC Address
Submit
Reset

6.9.3 Alert by Mail Configuration (12/16/24 ports)

To configure the raid controller email function, move the cursor bar to the main menu and click on the System Controls link. The System Controls menu will show all items. Move the cursor bar to the Alert By Mail Config item, then press Enter key to select the desired function. This function can only set by the web-based configuration.
The firmware contains SMTP manager monitors all system events

and user can select either single or multiple user notifications to be sent via "Plain English" e-mails with no software required.

6.9.4 SNMP Configuration

To configure the raid controller SNMP function, move the cursor bar to the main menu and click on the System Controls link. The System Controls menu will show all items. Move the cursor bar to the SNMP Configuration item, then press Enter key to select the desired function. This function can only set by the web-based configuration.

The firmware contains SNMP Agent manager monitors all system events and user can use the SNMP function from the web setting with no Agent software required.

6.9.5 View Events/Mute Beeper

To view the SATA RAID controller's information, move the mouse cursor to the main menu and click on the System Information link. The SATA Raid controller events Information screen appears. Choose this option to view the system events information: Timer, Device, Event type, Elapse Time and Errors. The RAID system does not built the real time clock. The Time information is the relative time from the SATA RAID controller power on.

6.9.6 Generate Test Event

Use this feature is to view test events.

6.9.7 Clear Events Buffer

Use this feature to clear the entire events buffer information.

6.9.8 Modify Password

To set or change the SATA RAID controller password, move the mouse cursor to Raid System Function screen, and click on the Change Password link. The Modify System Password screen appears.
The password option allows user to set or clear the SATA RAID controller's password protection feature. Once the password has been set, the user can only monitor and configure the SATA RAID controller by providing the correct password.

The password is used to protect the SATA RAID controller from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The SATA RAID controller will automatically go back to the initial screen when it does not receive any command in ten seconds.
To disable the password, press Enter key only in both the Enter New Password and Re-Enter New Password column. Once the user confirms the operation and clicks the Submit button. The existing password will be cleared. No password checking will occur when entering the main menu from the starting screen.

6.9.9 Update Firmware

Please reference the appendix A firmware utility.

6.10 Information

6.10.1 RaidSet Hierarchy

Use this feature to view the SATA RAID controller current raid set, current volume set and physical disk configuration. Please reference the this chapter "**Configuring Raid Sets and Volume Sets**"

6.10.2 System Information

To view the SATA RAID controller's information, move the mouse cursor to the main menu and click on the System Information

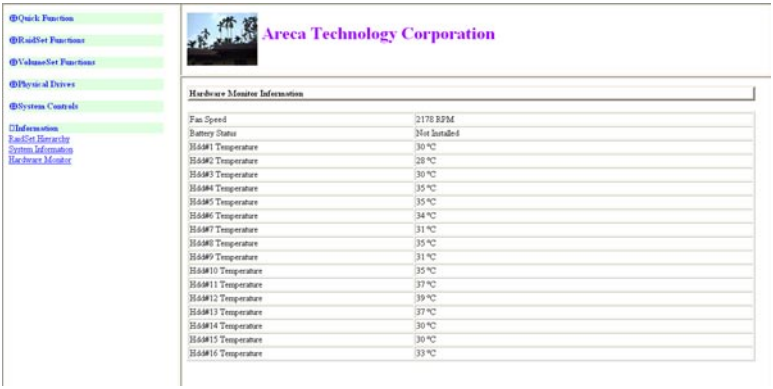
link. The SATA RAID controller Information screen appears.

Use this feature to view the SATA RAID controller's information. The controller name, firmware version, serial number, main processor, CPU data/Instruction cache size and system memory size/speed appear in this screen.

6.10.3 Hardware Monitor

To view the RAID controller's hardware monitor information, move the mouse cursor to the main menu and click the Hardware Monitor link. The Hardware Information screen appears.

The Hardware Monitor Information provides the temperature, and fan speed (I/O Processor fan) of the PCI SATA RAID controller.



Appendix A

Since the SATA RAID controller features flash firmware, it is not necessary to change the hardware flash chip in order to upgrade the RAID firmware. The user can simply re-program the old firmware and BIOS through the McRAID storage manager. New releases of the Firmware and BIOS are available in the form of a DOS file at web site. The file available at the web site is usually a self-extracting file that contains the following:

1XXXFIRMVVV.BIN Firmware Binary (where "1XXX" refers to the model name and "VVV" refers to the firmware version)
1XXXBIOSVVV.BIN BIOS Binary (where "1XXX" refers to the model name and "VVV" refers to the firmware version)
README.TXT It contains the history information of the firmware change. Read this file first before upgrading the firmware.
These files must be extracted from the compressed file and copied to one directory in drive A: or C:.

Upgrading Firmware Through McRAID Storage Manager

Get the new version firmware for your SATA RAID controller. For Example, download the bin file from your OEM's web site onto the C:

1. To upgrade the SATA RAID controller firmware, move the mouse cursor to "**Upgrade Firmware**" link. The "**Upgrade The Raid System Firmware**" screen appears.

2. Click Browse. Look in the location where the Firmware upgrade software is located. Select the File name click "**Open**".

3. Click the "**Confirm The Operation**" and press the "**Submit**" button.

4. The Web Browser begins to download the firmware binary to the controller and start to update the flash ROM.

5. After the firmware upgrade is complete, a bar indicator will show "**Firmware Has Been Updated Successfully**"

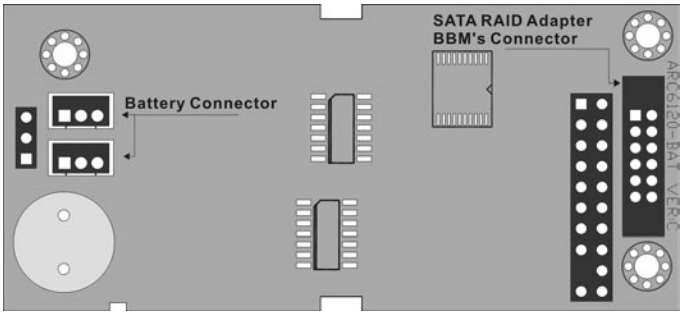
6. After the new firmware completes download, user should find a chance to restart the controller for the new firmware to take effect.

Appendix B

Battery Backup Module (BBM)

The SATA RAID controller operates using cache memory .The battery Backup Module is an add-on module that provides power to the PCI SATA RAID controller cache memory in the event of a power failure. The Battery Backup Module monitors the write back cache on the SATA RAID controller, and provides power to the cache memory if it contains data not yet written to the hard drives when power failure occurs.

BBM Components



BBM Specifications

Mechanical
- Module Dimension (W x H x D)
  40 x 22 x 85 mm
- BBM Connector
  2 * 6 box header

Environmental
- Operating Temperature
  Temperature: +5^{O} C to +40^{O} C
- Humidity: 45-85%, non-condensing
- Storage Temperature
  Temperature: -40^{O} C to 60^{O} C

• Humidity: 45-85%, non-condensing

Electrical

• Input Voltage
  +3.6VDC
• On Board Battery Capacity

1000mAH (1*1000mAH)

Installation

1. Make sure all power to the system is disconnected.
2. Connector J2 is available for the optional battery backup module. Connect the BBM cable to the 12-pin battery connector on the controller
3. Integrators may provide pre-drilled holes in their cabinet for securing the BBM using its three mounting positions.

Battery Backup Capacity

Battery backup capacity is defined as the maximum duration of a power failure for which data in the cache memory can be maintained by the battery. The BBM's backup capacity varied with the memory chips that installed on the SATA RAID controller.

Capacity	Memory Type	Battery Backup duration (Hours)
128MB DDR	Low Power (18mA)	56

Operation

1. Battery conditioning is automatic. There are no manual procedures for battery conditioning or preconditioning to be performed by the user.
2. Battery bad a tendency to "**remember**" its capacity. In order to make sure of all the capacity of your battery cells, allow the battery cell to be fully charged when installed for the first time. The first time charge of battery cells takes about 24 hours to complete.

Changing the Battery Backup Module

The LI-ION battery will no longer accept a charge properly. LI-ION battery life expectancy is approximately 1 to 5 years.

1. Shutdown the operating system properly. Make sure that cache memory has been flushed.
2. Disconnect the battery backup module cable from J2 on the SATA RAID card.
3. Disconnect the battery pack cable from JP2 on the Battery Backup Module.
4. Install a new battery pack and connect the new battery pack to JP2.
5. Connect the Battery Backup Module to J2 on the SATA card.
6. Disable the write-back function from the BIOS or Utility.

Note:

The BBM can not work in the mainboard which turn off the PCI-x/pci-exprss clock in the begining stage of power failure.

Appendix C

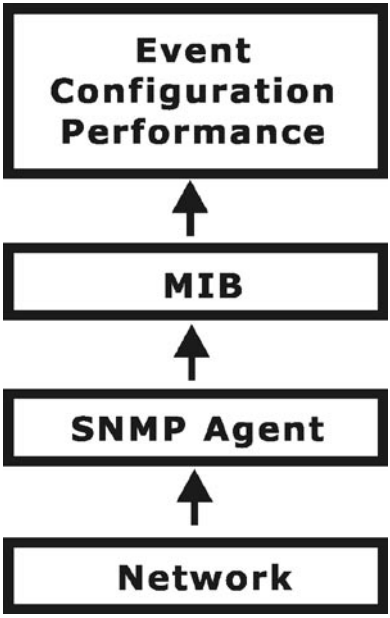
SNMP Operation & Definition

Overview

The McRAID manager includes a firmware-embedded Simple Network Management Protocol (SNMP) agent for the connect SATA RAID controller. An SNMP-based management application (also known as an SNMP manager) can monitor the SATA RAID controller. An example of a SNMP management application is Hewlett-Packard's Open View. The firmware-embedded SNMP agent can be used to augment the SATA RAID controller if you are already running SNMP management application at your site.

SNMP Definition

SNMP, an IP-based protocol, has a set of commands for getting the status of target devices. The SNMP management platform is called the SNMP manager, and the managed devices have the SNMP agent loaded. Management data is organized in a hierarchical data structure called the management Information Base (MIB). These MIBs are defined and sanctioned by various industry associations. The objective is for all vendors to create products in compliance with these MIBs so that inter-vendor interoperability can be achieved. If a vendor wishes to include additional device information that is not specified in a standard MIB, then that is usually done through MIB extensions.



SNMP Installation

The installation of the SNMP manager is accomplished in several phases:

- Installing the Manager software on the client
- Placing a copy of the management information base (MIB) in a directory which is accessible to the management application
- Compiling the MIB description file with the management application

Starting the SNMP function setting

- **Community Name**

Community name act as password of screen accesses to the SNMP agent of a particular network device. Type in the community names of the SNMP agent. Before access is granted to a request station, this station must incorporate a valid community names to its request; otherwise, the SNMP agent will deny access to the system.

Most network devices use "public" as default of their community names. This value is case-sensitive.

MIB Compilation and Definition File creation

Before the manager application accesses the RAID controller, user needs to integrate the MIB into the management application's database of events and status indicator codes. This process is known as compiling the MIB into the application. This process is highly vendor-specific and should be well-covered in the User's Guide of your SNMP application. Ensure the compilation process successfully integrates the contents of the ARECARAID.MIB file into the traps database.

Location for MIB

Depending upon the SNMP management application used, the MIB must be placed in a specific directory on the network management station running the management application. The MIB file must be manually copied to this directory. For example:

SNMP Management Application	MIB Location
HP OpenView	\OV\MIBS
Netware NMS	\NMS\SNMPMIBS\CURRENT

Your management application may have a different target directory. Consult the management application's user manual for the correct location.

Appendix D

General Troubleshooting Tips

Most of controller errors are traceable to external factors, such as conflicts with other installed cards, bad or incorrectly configured drives, loose cables, improper controller installation, or other installation errors.

To troubleshoot SATA RAID controller problems, try simplifying your hardware configuration by removing some other devices from the system and then adding them back one at a time.

Look for the latest information on SATA RAID Controllers as well as the newest drivers on the ARECA web site at http://www.areca.com.tw. The following general guidelines are for some specific error conditions:

Question 1:
The BIOS Message of the SATA RAID controller never appears on the screen:

Answer:
(1). Ensure the controller is inserted correctly into the PCI slot.
(2). Ensure 3.3 volts are being supplied to the PCI slot.
(3). Check the cabling between the SATA drives or enclosure the SATA RAID controller.

Question 2:
How many SATA RAID controllers can be installed into a computer system?

Answer:
Up to 4 RAID controllers in a system are supported.

Question 3:
The boot device cannot found

Answer:
Enter the system BIOS setup utility Per manufacture directions and configure it so that the volume set is once again selected as the

primary boot device (or first in the boot device list)

Question 4:
What PCI slots are supported by the SATA RAID controllers?

Answer:
For all PCI-X SATA RAID controllers, install card in a 64-bit/133MHz PCI-X for the best performance. It can also be used in 64-bit / 66 MHz slots, 32-bit/66MHz PCI slots as well as 32-bit/33MHz slots. All PCI-X SATA RAID controllers can not work with 5V PCI slot.

Question 5:
What is the difference between RAID 6 and RAID 5?

Answer:
RAID 6 allows two drives to fail simultaneously without downtime or data loss. However, RAID 5 only allows one drive to fail. RAID 6 thus provides a much higher level of fault tolerance than RAID 5. It is a perfect solution when data is mission-critical.
Due to this higher level of protection, users can set up larger RAID volumes, spanning up to 56 physical drives. With ARECA RAID 6 engine. RAID 6 and RAID 5 have similar performance in the SATA RAID controller

Question 6:
What products support RAID 6?

Answer:
RAID 6 is available with controller model with RAID 6 engine installed

Question 7:
What operating systems are supported?

Answer:
The SATA RAID controllers support Microsoft® Windows® Server 2003, Windows XP, Windows 2000, Red Hat Linux, SuSE Linux, and FreeBSD. For specific OS versions, see www.areca.com.tw for more information.

Question 8:
Will ARECA submit the Linux code to kernel.org?

Answer:
Yes. Shortly after we ship products, we will submit our code.

Question 9:
What is the warranty period?

Answer:
Like all ARECA External RAID controllers, the PCI-X or PCI-Express SATA RAID controller is backed by a 3-year warranty.

Question 10:
Which O/S (Operating System) will support X86 64-bit processors?

Answer:
The following O/S vendors have announced product support for AMD64 and Intel EM64T. Contact each vendor for more details. The following is our currently supported OS and version for 64-bit processor. We will support others shortly after other versions release.

Microsoft:
Production support will be available in:
- Windows XP Professional x64 Edition
- Windows Server 2003 64-Bit Edition

Red Hat:
Production support will be available in:
- Red Hat Enterprise Linux 3 update 2

SuSE:
Production support will be available in:
- SLES9

FreeBSD:
Production support will be available in:
- FreeBSD 5.3

Question 11:
Is it possible to write software that will run on Intel's processors with Intel® EM64T, and AMD's 64-bit capable processors?

Answer:
Yes, in most cases. Even though the hardware microarchitecture for each company's processor is different, the operating system and software ported to one processor will likely run on the other processor due to the close similarity of the instruction set architectures. However, Intel processors support additional features, like the SSE3 instructions and Hyper-Threading Technology, which are not supported on non-Intel platforms. As such, we believe developers will achieve maximum performance and stability by designing specifically for Intel architectures and by taking advantage of Intel's breadth of software tools and enabling services.

Question 12:
How will Intel® EM64T work and what software is there to take advantage of 64-bit extensions?

Answer:
Platforms with Intel® EM64T/AMD64 can be run in three basic ways (note: a 64-bit capable BIOS is required for all three scenarios):

1. 32-bit O/S and 32-bit applications (Legacy Mode): No software changes are required, however the user gets no benefit from Intel® EM64T or AMD64;

2. 64-bit O/S and 32-bit applications (Compatibility Mode): This usage requires all 64-bit device drivers. In this mode, the O/S will see the 64-bit extensions, but the 32-bit application will not. Existing 32-bit applications do not need to be recompiled, and may or may not benefit from the 64-bit extensions. The application will likely need to be recertified by the vendor to run on the new 64-bit extended O/S.

3. 64-bit O/S and 64-bit applications (64-bit Mode): This usage requires 64-bit device drivers. It also requires applications to be modified for 64-bit operation and then recompiled and vali dated.

Appendix E

Technical Support

Areca Technical Support provides several options for Areca users to access information and updates. We encourage you to use one of our electric services, which provide product information updates for the most efficient service and support. If you decide to contact us, please have the information such as Product model and serial number, BIOS and driver version, and a description of the problem.

Glossary

2TB

The 32-bit versions operating systems have a maximum limitation of 2 TB per volume set. 64-bit versions remove this limitation, so if you are building large warehouses, you should consider 64-bit versions.

Array

An array is a logical disk comprised of multiple physical hard disks. The number of hard disks in an array is dictated by the type of the array and the number of spares that may be assigned to it. (Arrays are also sometimes referred to as containers). Furthermore, whether an array can be built using part of the space on a disk (as opposed to being forced to use the whole disk) depends upon the implementation. Arrays are typically used to provide data redundancy and/or enhanced I/O performance.

ATA

Acronym for "**AT Bus Attachment**" - a standard interface to IDE hard disks. Western Digital's IDE disk interface was standardized by ANSI to form the ATA specification using a 16-bit ISA bus.

Auto Reassign Sector

SATA drives perform automatic defect re-assignment for both read and write errors. Writes are always completed - if a location to be written is found to be defective, the drive will automatically relocate that write command to a new location and map out the defective location. If there is a recoverable read error, the correct data will be transferred to the host and that location will be tested by the drive to be certain the location is not defective - if it is found to have a defect, it will be automatically relocated to a new location and the defective location mapped out. In the event of an unrecoverable read error, the error will be reported to the host and the location flagged as potentially defective. A subsequent write to that location will initiate a sector test and relocation should that location have a defect.

Battery Backup Module

Many modern RAID controllers are armed with a battery backup Module (BBM). While an UPS protects most servers from power fluctuations or failures, a BBM provides an additional level of protection. In the event of a power failure, a BBM supplies power to retain data in the RAID controller's cache, thereby permitting any potentially dirty data in the cache to be flushed out to secondary storage when power is restored.

BIOS

(Basic Input/Output System) software is stored on a chip and provides an interface between the operating system and the hardware. Usually the BIOS is built into a ROM chip installed on the motherboard so that the BIOS will always available and not affected by disk failure.

Cache

Controller memory used to speed up data transfer to and from a disk.

Consistency Check

In RAID, check consistency verifies the correctness of redundant data in an array. For example, in a system with dedicated parity, checking consistency means computing the parity of the data drives and comparing the results to the contents of the dedicated parity drive.

Driver

It is a piece of software – that is often executed in kernel mode – that controls a hardware device. Typically drivers provide an interface by which applications can use the device in a uniform and hardware-independent manner.

Hot Spare

An extra physical disk drive in a RAID configuration that controller can use to automatically rebuild a system drive when another drive fails. The hot spare drive must have at least as mush capacity as the largest disk drive in the array or the rebuild may not start.

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An extra physical disk drive in a RAID configuration that controller can use to automatically rebuild a system drive when another drive fails. The hot spare drive must have at least as mush capacity as the largest disk drive in the array or the rebuild may not start.

Hardware RAID versus Software RAID

Beyond the different types of RAID, there are two implementation forms: hardware-based and software-based. Hardware-based RAID is obviously implemented at a physical level, whereas software-based RAID is done after you start using the operating system. It is always optimal to have RAID done at a physical level.

Hot Swap

To pull out a component from a system and plug in a new one while the power is still on and the unit is still operating.

NVRAM

(Non-Volatile Random Access Memory) A memory unit is equipped with a battery so that the data remain even after the main power had been switched off. Actually an EEPROM used to store configuration information.

Parity

A technique used to protect a system from data loss due to faults. When parity is implemented (RAID3 and RAID5), data written is logically XOR'd together to calculate parity, which is stored on the drives along with the data. In a system with three drives, the data is written to two drives and the calculated parity is stored on a third drive. If one drive fails, data on the failed drive is reconstructed from other data and parity.

PCI Express

An advanced version of the PCI bus introduced in 2002. Rather than the shared, parallel bus structure of PCI, PCI Express provides a high-

speed, switched architecture. Each PCI Express link is a serial communications channel made up of two differential wire pairs that provide 2.5 Gbits/sec in each direction. Up to 32 channels may be combined, creating a parallel interface of independently controlled serial links.

PCI-X

(PCI eXtended) an enhanced PCI bus technology is backward compatible with existing PCI cards. PCI and PCI-X slots are physically the same. PCI cards run in PCI-X slots, and PCI-X cards run in PCI slots at the slower PCI rates. First introduced in 1999, PCI-X offered increased speed over PCI and has steadily increased to more than 30 times that of the original PCI bus. For a comparison of all PCI technologies.

RAID

(Redundant Array of Independent Disks) a disk subsystem that is used to increase performance or provide fault tolerance. RAID can also be set up to provide both functions at the same time. RAID is a set of two or more ordinary hard disks and a specialized disk controller that contains the RAID functionality. RAID has been developed initially for servers and stand-alone disk storage systems. RAID is important especially when rebuilding data after a disk failure.

Rebuild

When a RAID array enters into a degraded mode, it is advisable to rebuild the array and return it to its original configuration (in terms of the number and state of working disks) to ensure against operation in degraded mode.

SATA (Serial ATA)

The evolution of the ATA (IDE) interface that changes the physical architecture from parallel to serial and from master-slave to point-to-point. Unlike parallel ATA interfaces that connect two drives; one configured as master, the other as slave, each Serial ATA drive is connected to its own interface. At initial introduction, Serial ATA (SATA) increases the transfer rate to 150 MB/sec (1.5Gb/s).

SMART

This technology provides users with advanced warning of Disk Drive failures thus enabling the Operating System to warn Users of potential failure. S.M.A.R.T. was included in EIDE drives with the ATA-3 specification.

SNMP

Since it was developed in 1988, the Simple Network Management Protocol has become the de facto standard for inter-network management. Because it is a simple solution, requiring little code to implement, vendors can easily build SNMP agents to their products. SNMP is extensible, allowing vendors to easily add network management functions to their existing products. SNMP also separates the management architecture from the architecture of the hardware devices, which broadens the base of multi-vendor support.

Volume Set

A volume set is a concatenation of storage elements that may be RAID arrays, JBODs, or simply areas of disks that are not part of RAID arrays.

Write-back

When a cache is operating in write-back mode, data written into the cache is not immediately written out to its destination in secondary storage unless the heuristics governing the flushing of dirty data demands otherwise. This methodology can improve the efficiency of write operations under favorable circumstances. However, its use can potentially lead to incoherencies in a system that is not protected from power fluctuations or failures.

Write-through

When a cache is operating in write-through mode, data written into the cache is also written to the destination secondary storage devices. Essentially write completion does not occur until the data is written to secondary storage. Thus the contents of the cache and the secondary storage are always consistent. The advantage is that the possibility of data corruption is greatly reduced. The disadvantage is that write-

through operations are more time consuming.

XOR-Engine

All RAID arrays (with the exception of RAID 0, RAID 1 and RAID 10) require parity to be calculated and written to the array in conjunction with data. Typically the parity is a simple XOR on the bytes comprising a stripe. This is a computationally intensive operation that many modern RAID controllers perform using a dedicated ASIC (instead of calculating them in firmware on the main embedded processor's core). This dedicated ASIC is often referred to as a XOR-engine.